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Energy, Utilities and Chemicals | the way we see it

European Energy Markets Observatory

2008 and Winter 2008/2009 Data Set
Eleventh Edition, November 2009

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

Welcome to the 11th edition of the European Energy Markets Observatory (EEMO), covering 2008 and the early 2009 period.

On top of summarizing the Observatory's key findings, this editorial analyzes the crisis' effect on the electricity, gas and environment sectors in Europe; gives an update on security of electricity and gas supply; and discusses the evolution of the energy's sector impact on the environment in the light of the European Union (EU) "Climate-Energy" Package.

The key challenges in the first half of 2008 were still about responding to the growing energy demand while decreasing CO_2 emissions

In 2008, the energy demand increase combined with the necessity of replacing ageing infrastructures, led to extremely high investments requirements: the EU estimated that for electricity and gas, €1,600 billion investments were needed by 2030[1]. Building these infrastructures within these timeframes constituted in itself a considerable challenge. The obligation to reduce CO_2 emissions to combat global warming made this challenge even more complex.

As we analyze in this EEMO edition, the Utilities investments have continued to grow; in 2008 the total investments amounted to €120 billion with the largest share (53%) for electricity generation (including renewables) and 24% for the electricity grids and gas pipelines.

However, the energy mix choice continues to pose a problem: three quarters of the power stations under construction will be supplied by fossil fuels and therefore emit CO_2. In 2008, investments in sustainable energy (renewables and energy efficiency) increased at a much lower pace (2%) than during the previous five years when the compound annual growth rate (CAGR) reached 56%[2].

Oil price reached a peak of around US$150 per barrel in July 2008. Gas, coal and electricity prices increased also with peaks between the summer of 2008 and the beginning of winter 2008/2009. During the summer of 2008 the rise in oil and gasoline prices pushed the US to reduce its oil consumption. This unprecedented demand elasticity to price triggered a decrease in oil prices that was followed by a fall in all energy prices.

The crisis has positive and negative impacts on these challenges

On the positive side

- *A fall in demand:* During the autumn of 2008 the economic recession triggered a decrease in oil prices and demand. The International Energy Agency (IEA) anticipates for 2009 the highest fall in global oil demand since 1982, to 84.6 millions barrels per day (bpd), a decrease of 1.9% compared to 2008[3]. In H1 2009, the electricity and gas consumption of the industrial sector declined significantly everywhere in Europe by 10 to 20% on a monthly basis (compared to the same months in 2008). However, the tertiary sector, where the main energy consumption is linked to buildings and the residential sector where energy is a vital need, have been resilient to the crisis. For the residential sector a small consumption increase (when corrected by temperature factors) was even observed in some European countries.

  For the first time since World War II, electricity total consumption is expected to drop worldwide by 3.5% and gas consumption by a similar amount in 2009. In H1 2009 the aggregated overall electricity consumption for the main European countries fell by about 5% and the gas consumption by 9% compared to H1 2008. In H2 2009, thanks to the (limited) recovery of certain industries, we should witness a lower decrease of the industrial sector consumption and thus a slow down of the overall consumption decrease compared to the same period in 2008 (where decline started). In 2010, if this trend continues and if the tertiary and residential sectors are not really impacted by the forecasted growing unemployment, we could witness a small growth in consumption compared to a dull 2009 year. However, with the slow and probably small economy recovery in Europe, it is hard to predict when the 2008 levels of energy consumption will be reached again.

- *A drop in CO_2 emissions*, mainly resulting from the fall in energy consumption. In 2008, the drop for the ETS sectors emissions in Europe was around 3.7% (compared to 2007) and the total European CO_2 emissions should have dropped by around 1.5%[4].With the economic recession, a further drop for 2009 is anticipated. This explains why the CO_2 prices have dropped on the exchange markets (€13 per ton of carbon equivalent in September 2009, or almost a 60% decline since the 2008 summer peaks). This market move was probably amplified by the credit crunch, as companies which received these emissions rights free of charge, were inclined to sell some of them, even at low prices, in order to generate cash. These relatively low ETS prices provide little incentive for generators to switch from coal to gas generation or to renewable energies.

1 Inter-connecting Europe - New perspectives for trans-European energy networks, EC DG-Tren, 2008

2 Global Trends in Sustainable Energy Investment 2009, UNEP/SEFI/New Energy Finance

3 Oil Market Report, IEA, October 10, 2009

4 Provisional data issued by the European Environment Agency, September 2009

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- A *supply and demand balance improvement* for electricity and gas excluding exceptional events such as the cold spell in Europe in the beginning of January 2009 and the gas crisis between Russia and Ukraine (see below).
- *Falling prices:* The oil price fell from around US$150 per barrel during the summer of 2008 to around US$70 at the end of September 2009. According to some economists this price drop created a bigger relief in the present economic recession than the cumulated governmental stimulus plans. At the present stage governments will try to avoid a significant oil price increase that would jeopardize the recovery. Therefore, the UK and the US regulators have decided to strengthen their collaboration on oil related markets in order to limit speculation and increase transparency. The gas price which peaked at €32/MWh for a delivery in Zeebrugge (Belgium hub) in September 2008 reached the very low price of €7/MWh in September 2009. Coal price has also decreased from a peak of €216 per ton in July 2008 to about €70 per ton in September 2009. The same is observed for electricity prices on the wholesale market – EPEX Spot France – which, after peaking at €117/MWh in mid October 2008 reached €23/MWh in September 2009.

On the negative side

- *Investments are impacted:* The credit crunch combined with lower demand and lower Return on Investments(ROI) has pushed down the investments in the energy sector. These investments are, however, badly needed for long term energy security of supply. In Europe, the major Utilities, which recently spent their war chests for acquisitions, have announced postponed investments. In Germany, E.ON has revised its investment plan for 2009-2011, from €36 to 30 billion. In Italy, Enel intends to reduce its 2009-2013 investment plan by €12 billion (from €44 to 32 billion), in Spain, Iberdrola has announced 2009 investments of only €4.5 billion down from the €13 billion initially planned and Gas Natural-Union Fenosa will slash investments from the previously announced €21 billion to €11-13 billion.
  Fortunately, many stimulus plans contain incentives to investments:
  - In Europe, a €4 billion energy infrastructure investment plan was voted in May 2009 by the EU Member States and the European Parliament;
  - President Obama's "Stimulus Plan" allows for investments of US$45 billion in new energy-related expenditure, US$20 billion in new tax cuts for energy and US$4.5 billion in the smart electrical grid.

  However, because of administrative delays, the stimulus packages will only start to be implemented at the end of 2009 and early 2010 and could have tangible effects on investment levels next year and onwards.
- *Renewable energies are significantly impacted:* After significant growth in the past years, European investments in renewable energies fell by 14% in the second half of 2008 (compared to H2 2007) to US$21.2 billion[5]. In the US, there was a 50% reduction to US$10.7 billion. The IEA forecasts a global drop of about 38% in 2009[6]. The good news is that Q2 showed a recovery in investments compared to Q1 but still a decrease year-on-year. Wind turbine and solar panel manufacturers have suffered at the end 2008 and in Q1 2009 with some of them further impacted by Asian manufacturers' competition. One can easily predict that this competition will become tougher in the future. China, for example, has ambitious targets for its own wind energy development and has adopted a national preference for Chinese manufacturers thus boosting its industry that should become, in 2009, the world's leading exporter of wind turbines.

  One can wonder if this downward trend will continue.

  On the one hand, the current economic signals don't give incentives to invest in renewable energies. The prices of fossil fuels (and especially in Q2 2009 with the very low gas price) make such investments even less profitable than before the crisis. In addition, at their current low price, CO_2 emissions represent only a small burden for gas or coal fired plants and, therefore, do not help to close the economic gap with the renewable energies.

  But on the other hand, legislation and stimulus plans will push up investments in renewable energies:
  - In Europe the "Climate-Energy" Package aims at increasing the share of renewables in final energy consumption to 20% by 2020. Meeting this objective would mean a significant boost from the present levels. In May 2009, the €4 billion energy infrastructure investment plan was adopted by the EU Member States; €565 million is earmarked for specific offshore wind projects; and €910 million for electricity interconnectors (helping the integration of renewable energy into the grid);
  - In the US: the Obama plan aims, in particular, to double the proportion of renewable energies in the energy mix in three years (from 7 to 14%);

[5] New Energy Finance

[6] The impact of the financial and economic crisis on global energy investment - IEA background paper for the G8 Energy Ministers' Meeting, May 24-25, 2009

- In China: the €400 billion two-year stimulus plan announced by Beijing in November 2008 treats the environment generously with €35 billion or 8% of the total funds assigned to the protection of the environment.

Thanks to these stimulus plans announcements, "clean tech" financial deals are growing again. After a slowdown, green business is increasing again with fund raising, and mergers and acquisitions amounting to €8.8 billion in Q2 2009 compared to €1.1 billion in the previous quarter.

In summary, since the end of 2008, we have witnessed a green bubble deflation but thanks to the political decisions favoring a green economy development, some recovery is foreseen for the 2009 year end and for 2010.

- *Nuclear investments are differently impacted by the crisis depending on the region:* Nuclear energy is (with, to a certain extent, hydro power) the only competitive energy source that can be scheduled and that is capable of producing electricity on a large scale without generating CO_2 emissions. Combined with safety and operational improvements these are the reasons why, since a few years ago, we are witnessing a revival of nuclear power in a number of regions.

  Since the last EEMO edition there have been two major events – the election of Barack Obama as the US president and the global financial crisis – which have had an effect on altering the approach to nuclear power in some regions:

  - In Asia nothing much has changed with the crisis and development is going ahead as planned. Moreover, China has decided to speed things up with plans to put six nuclear reactors into operation each year for the next few years. India also has an ambitious program and has now access to Western technology, thanks to agreements it signed in 2008;
  - In Europe, the former Eastern bloc countries have to a greater or lesser extent been hit by the recession, which is likely to delay their nuclear program. However, this winter's Gazprom gas supply disruption made them realize their Russian gas dependency and resulted in strengthening their resolve to build new nuclear power stations. The financial and economic crisis has also been severely felt in Russia and will probably have the effect of slowing down their ambitious nuclear program;
  - In Western Europe, there are two particularly interesting cases. The UK is probably the European country which is going to build the largest number of nuclear reactors. On the one hand, it has to replace its old nuclear power stations and on the other to maintain its energy independence in spite of gradually depleting North Sea natural gas deposits. The country has embarked on the process of authorizing and building these reactors in a very detailed and democratic manner, which should result in the first reactor connected to the grid around 2018. And in Germany, the CDU/CSU-FDP coalition won September elections, which is favorable to the extension of nuclear plants life time. However, a decision to build new reactors in the immediate future is unlikely;
  - With the US Administration focused on renewable energies, the current ambition of building more than 30 reactors should be cut down. The 2005 Energy Bill Act included US$18 billion guaranteed loans for the first three or four reactors. These selected reactor projects will go ahead, but it will be much more difficult for the others, as US Utilities – that are relatively small and now have difficulties to get loans – will hesitate in taking the risk of financing the large investments required.

  In summary, the crisis has hit the planned investments in energy and, according to experts the signs remain alarming for the future. Certainly, the present unprecedented crisis, a slow post crisis growth in Europe, and the energy savings regulation impact should lead to lower needs. The UCTE revised down its prospects from 50,000 MW to 20,000 MW of additional electricity generation investment needed to maintain security of supply. This forecast assumes that current planned investments are not cancelled (which is challenging) and does not take into account additional plant closures (estimated at 8,000 MW of generating capacity by 2016) linked to early decommissioning triggered by the Integrated Pollution Prevention and Control Directive and the Large Combustion Plant Directive which were adopted in December 2008.

  An upturn in investments after the crisis is anything but sure and could be insufficient as consumption restarts.

  As a conclusion, we believe that, without a focus on investments now, the after crisis "wake- up" could be difficult.

The crisis has challenged the resilient character attributed to the Utilities sector

In previous years, Utilities have invested large amounts in cross border acquisitions thus decreasing their (previously large) war chests and increasing their gearing ratio. The combination of these financial factors with lower revenues linked to consumption and prices decreases has created a perception of financial risk and led to a drop in rating ratios.

To restore the situation, Utilities have announced large divestment plans:

- E.ON has a €10 billion divestment plan of which part will be in the high voltage electrical grid;
- ENEL has a €10 billion divestment plan. It has already sold its high-voltage power grid to Terna for €1.15 billion and plans to divest from "Green Power";
- EDF has announced a €5 billion plan. It has sold 20% of British Energy shares to Centrica, and is looking at divesting some of its grid activities.

Other Utilities will bid for these assets but also new actors such as private equity funds, pension funds or sovereign funds will manifest themselves, especially in the infrastructure part of the value chain.

Security of supply: still to be monitored

Electricity security of supply improved in 2008 but was threatened in early 2009

The real margin[7] hugely improved in 2008 from 5.3% in 2007 to 9.2% for the UCTE countries, due to decreases in peak loads and capacity additions. However, and despite the lower consumption, early January 2009 exceptional cold threatened the generation/consumption balance. For example, France had a 92,400 MW record electricity peak. It had to import around 1,000 MW during a few consecutive days (mainly from Germany). The situation would have been more tense in a "normal" period and RTE, the French TSO, estimates that with "normal demand", 1,000 MW more imports would have been needed.

In the future, RTE foresees that peaks will be sharper and higher in France so tense situations could still happen despite a general improvement linked to lower consumption and past investments.

In the longer term, the impact of new technologies will have to be included in demand forecast. For example, the Third Legislative Package (adopted in April 2009) recommends that a target of 80% of the population will be provided with intelligent meters by 2020. This legislation should push more European countries to make this investment compulsory, as exists in Sweden. Smart meters, in conjunction with demand side management Utilities programs should lead to significant savings in electricity consumption, peak power and CO_2 emissions. A Capgemini study[8] shows that dynamic programs launched in the EU-15[9] countries could save 200 TWh per year by 2020 (which represents the combined residential consumption of Spain and Germany) and 100 million tons of CO_2 (a significant share of the gap to be filled between now and 2020 to reach the EU objectives).

However, energy efficiency programs and CO_2 saving programs tend to favor electricity usage by boosting heat pumps usage, public transportation and electrical cars.

For electrical cars the loading battery patterns should be carefully planned in order not to increase peak power demand.

Europe's high dependency on Russian gas supplies is an issue

As analyzed in last year's EEMO and in the previous ones, the EU's high dependency on Russian gas (25%) is a threat to security of supply. There were no improvements on this situation in 2008 and as much as 50% of EU gas could still be imported from Russia in 2030.

In January 2009, there was a second "wake-up call" as a consequence of this high Russian gas dependency. A commercial and political dispute between Russia and Ukraine had deprived Europe of nearly all Russian supplies during a period of 22 cold days. These cuts had dramatic consequences for countries like Bulgaria which is 100% Russian gas dependent.

Let's not forget that history repeats itself!

The dramatic fall of Gazprom's gas exports to non CIS countries (45%) in H1 2009 is more cyclical than structural and measures need to be taken to improve Europe's security of supply.

These measures are of different types:

- *Increase the LNG share in the total gas supply,* as LNG enables access to 80% of worldwide proven gas reserves thus providing a good supply diversification.
  In 2008, in a tense supply and demand situation, LNG trade movements rose by 5.8% above gas traded by pipeline growth of 4.7%.
  In early 2009 the situation changed; the LNG market that was seller's market became a buyer's market for several reasons:
  - On the supply side, in 2009, two liquefaction plants have been started by Qatargas; more are planned for 2010 and a product surplus is now forecasted for 2010;
  - On the demand side, Asian demand has decreased notably because of the Japanese Kashiwazaki-Kariwa nuclear plant being progressively restarted. The development of unconventional domestic gas in the US combined with the recession has also very strongly decreased the US demand.
    In Europe, if all the new European LNG regas terminals are built, there should be a capacity surplus. However, due to a lack of demand combined with the credit crunch and difficulties in public acceptance, some of those investments could be differed or cancelled.
    On the longer term, the prediction is that it will take two or three years to absorb this LNG "bubble" and that a tense supply market could prevail again.
- *Increase storage:* The storage demand in the EU is set to grow quite significantly over the next few years, as the EU becomes more dependent on imports which are less flexible compared to indigenous production. The EU recommends that each country has a storage capacity of 16% of its annual consumption (60 days). Thanks to the past year's investments, storage capacity in Europe increased by 5% in 2008 representing 17% of its annual consumption. More than 100 new facilities or extensions projects have been listed but certain projects already have been cancelled or delayed for financial reasons.
- *Build new pipelines routes* enabling the import of gas from Central Asia (mainly Azerbaijan, Turkmenistan and Kazakhstan) without passing through Russia and thus avoid using Gazprom

[7] Percentage of difference between real generation capacity – which integrates non-usable and unavailable generation capacities – and peak load

[8] The Capgemini Point of View "Demand Response: a decisive breakthrough for Europe" is available at http://www.capgemini.com/resources/thought_leadership/demand_response_a_decisive_breakthrough_for_europe/

[9] EU 15: original 15 Members of the European Union until May 1, 2004: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the UK.

pipelines. The Nabucco pipeline is the EU's flagship project. Its expected supply capacity should amount to 6% of annual European consumption and it is planned to start operations in 2014. However, it is encountering a lot of difficulties.
In addition to financing and construction hurdles, the greatest challenge for Nabucco is the competing South Stream project sponsored by Gazprom and Eni (Italy) and now other EU Member States companies are getting involved (including France's EDF). In order to fill in the South Stream, Gazprom has extended its importing gas contracts from some of those Central Asian countries, notably Azerbaijan, and is financing regional pipelines (or pipeline extensions) to enable more gas from these countries to flow to Russia.
So today Nabucco's main challenge is to secure its gas supply as Central Asia will not be able to provide enough gas. Iran and Iraq gas could be additional resources to those providers, but the present political situation and security issues make these alternatives uncertain.

This situation illustrates the difficulty for EU Member States to switch from national security of supply concerns to a Europe-wide view and for Europe to implement a real European energy policy.

There has been tangible progress towards a European single market

A fluid and transparent market favors cross border exchanges thus increasing solidarity between Member States and improving security of supply for each of them.

- In 2008, *electricity* exchanges have increased thanks to new interconnectors and wholesale markets have started to consolidate (e.g. French Powernext and German EEX started their common operations in July 2009). Other actions such as enhancing market couplings and coordinating and optimizing grid operations (e.g. Coreso) have also contributed to progress towards a single European electricity market.
- To decrease the numerous physical congestions, investments in the gas market were budgeted in 2008 for hundreds of millions of euros (a positive trend compared to previous years). In addition to physical capacity extensions, increased information transparency and probably the creation of a European gas price index are key enablers for quick decisions and acts during supply threats. It has to be noted that, after long negotiations with the European Commission, GDF SUEZ agreed in July 2009 to limit its reserved gas pipeline capacity for imports into France to less than half by 2014 from two-thirds. This decision will contribute to opening the market to new entrants and to increasing its fluidity.
- On the legislative front, a mild version of the EU Third Legislative Package was adopted in April 2009. It includes, in addition to the preferred option, Ownership Unbundling, two alternatives: the Independent System Operator (ISO), and the Independent Transmission Operator (ITO). In the latter option, which was supported by Germany and France, TSOs are allowed to remain part of the integrated Utility provided they comply with strong "arm length" rules with their Utility shareholder and accept that the regulator has a powerful role in investment decisions. As a consequence, this "sweetened" ITO solution, could prove to be very difficult to operate. The Third Legislative Package also establishes an EU Agency for the Cooperation of Energy Regulators (ACER), with powers to adopt binding decisions on cross-border issues and on the EU internal market.

Climate change: what real progress?

The "Climate-Energy" Package was adopted by the EU on April 6, 2009

By 2020, the EU is committed to reducing its overall Greenhouse Gas (GHG) emissions to at least 20% below the 1990 levels, to increasing the share of renewables in energy use to 20% and to reduce energy consumption by 20%.

For the sectors covered by ETS (mainly energy, Utilities, chemicals and large manufacturing firms) free allocation of emission will be progressively replaced by rights auctioning, with a 100% auctioning by 2020. However, for the power generation sector, the auctioning of 100% of allowances will start in 2013. These certificates will then have a "real" price and windfall Utilities profits, as reported in 2007, should disappear.

Is the EU 3x20 objective likely to be reached in 2020?

Even if in 2008 and probably in 2009 we should observe a decrease in CO_2 emissions, these decreases are linked to a cyclical effect – the economic crisis – and not a structural one. Structural effects will appear when buildings and transportation related policies and regulations in favor of energy savings and CO_2 emissions reduction will start having tangible effects. In this respect 2020 is a short-time horizon for the renovation of a significant portion of the existing buildings, and for the switch of the present car fleet to electrical cars.
So, we are not yet on the right track and more actions should take place.

Before listing them, let's look at the international situation.

The international situation is unclear

A recent Energy Information Administration (EIA) report[10] shows that by 2030, worldwide energy consumption should increase by 44% and CO_2 emissions by 39%. With continued heavy reliance on fossil fuels expected for most of the non-OECD economies, much of the increase in CO_2 emissions is projected to occur among the developing, non-OECD nations. In 2006, non-OECD emissions exceeded OECD emissions by 14%. In 2030, however, non-OECD emissions are projected to exceed OECD emissions by 77%.

As atmospheric pollution is global, it is crucial that commitments on CO_2 emission limitations be taken by other large emitting regions of the world. If not, European efforts will be a drop of water in the ocean and their cost could jeopardize Europe's development.

[10] International Energy Outlook 2009, EIA, May 2009

With the exception of Japan's new prime minister's promise to make ambitious cuts in his country's GHG emissions, the recent news from this front is not positive:

- In August 2009 the Australian Government's proposed Carbon Pollution Reduction Scheme failed to pass in a Senate vote;
- The election of President Barak Obama raised hopes that the US would adopt binding limitations on CO_2 emissions, however the Waxman-Markey Energy law that includes a cap and trade system was adopted only with a thin majority by Congress and should encounter a lot of difficulties in the Senate. If the law is not passed by December 2009, the US will have additional difficulties, during the Copenhagen summit, to convince the developing countries to adopt quantitative GHG emissions limitations.

In any case these "post 2012 Kyoto Protocol" discussions will be very difficult as developing countries, notably China and India, want as counterparts not only strong commitments on Western countries' reductions but also more technology transfers and funding. In a nutshell, they are reluctant to sacrifice their economic development, needed for their social cohesion, to strong CO_2 emission reduction objectives.

What, in addition, can be done to meet EU objectives?

- *Electricity generation:* The contribution of renewable and nuclear plants to a lower carbon energy mix has already been touched on. Coal is an abundant energy resource with around 150 years of reserves (compared to oil reserves estimated at around 60 years) and well spread geographically.

  It is thus important to invest in Carbon Capture and Storage (CCS) research and demonstration projects in order to lower significantly the cost of this technology. In 2008, CCS activities in Europe have increased but obviously more needs to be done: even if all the 50 reported projects were to go forward, they would represent the annual avoidance of 80 million tons of CO_2 which is less than 4% of the total ETS allowances (that amount to two billion tons). Let's note that in the EU May 2009 energy infrastructure investment plan, €1.050 million was allocated for seven additional CCS projects. In addition to these demonstration or pilot projects, research efforts on the process itself are needed. A framework has also to be developed regarding the legal status of the CO_2 storage and, as there are already negative local reactions towards the CO_2 storage facilities, communication schemes for neighborhood citizens have to be worked on.
- *Energy savings:* This is a "no brainer" as it helps to decrease CO_2 emissions and to increase security of supply. However, related actions require a long term political will, significant investments and a dynamic participation of citizens.

  These actions are multifaceted and include legislation decisions, companies' actions in industrial and tertiary sectors, Research & Development efforts as well as individual's behavioral changes

  - Legislation has to provide for mature technologies deployment. The EU's decision to withdraw progressively incandescent bubbles from the market and its recommendation to deploy smart meters for 80% of the population by 2020 are good examples. At the countries level, legislations have been adopted to reduce energy consumption and CO_2 emissions. For example in France, the *Grenelle de l'environment*[11] comprises various measures to improve building insulation (400,000 homes per year at cruising speed), to reduce the cars' CO_2 emissions with a "green sticker" (in order to meet the European standard of 120 g/km in 2012) and to encourage the use of rail transportation.
  - A lot has already been done in the industrial sector. In OECD countries, the industrial energy intensity has been divided by two over the last 35 years and is at 0.07[12]. This compares with much higher figures in developing countries – 0.63 in China and 1.23 in Russia – showing that these countries have a lot of room for improvement.
  - In the computer industry major progress in computer consumption (leading to up to 40% reduction) and recycling has been made by IT hardware manufacturers. Additional 30% energy savings can be achieved by installing and running specific software that, for example, switches the computer to standby after it has been idle for an hour. Lastly, Internet development and video-conferencing enable working from home which cuts down on travel.
  - More needs to be done in the tertiary sector by decreasing the building's energy consumption. This is a major point, as worldwide buildings' (residential and commercial) potential savings represent today's global transportation sector energy consumption!
  - The proposed EU Public Private Partnership on buildings is a laudable attempt to reach the implementing intermediaries (construction industry, and architects) and achieve country relevant energy efficiency methods and standards. These buildings could be able to generate and store energy, thus avoiding peak demands by shifting loads.
  - Efforts focusing at the optimization of cities' energy systems, i.e. integration and adjustment of energy production and consumption are necessary. Control, monitoring and supervision are needed for which Information and Communication Technologies (ICT) technologies are indispensable at the technology as well as at the system level. On both sides of the Atlantic, innovative smart cities projects are launched: in Freiburg (Germany),

[11] The "Grenelle de l'Environnement" is a Round Table on environmental issues, instigated by the President of France, Nicolas Sarkozy, to define the key points of government policy on ecological and sustainable development issues for the coming five years. More information are available at http://www.legrenelle-environnement.fr

[12] Measured in tons of equivalent oil per US$1,000 GDP

BedZed (UK) and Malmö (Sweden) in Europe, and in Boulder and Miami (US). These projects usually gather the municipalities, technology and ICT firms and the local Utilities.

- Technologies: new energy technologies have a pivotal role to play in ensuring Europe meets its targets. The EU's Strategic Energy Technology Plan (SET-Plan) involves setting out a long-term energy research, demonstration and innovation agenda for Europe. The Seventh Framework Program for Research and Technological Development (FP7) paves the way for implementing the objectives of the SET-Plan. It runs from 2007 to 2013, and a €2.35 billion budget is dedicated to non-nuclear energy research. Despite these efforts, and given the huge challenges that lie ahead to transform the energy sector into a low carbon sector, the present European Research & Development and Demonstration effort pales in comparison to the recent announcements and new initiatives by the US, Japan, China and Korea.
- Individual behaviors: It is extremely important to give the customers the right price signals and reward them for their energy conservation behavior changes.

  In addition to increasing the level and quality of information on energy real issues, it is important to give to customers:

  - ✓ Tools (as smart metering, energy audits, white products energy related labels…) enabling them to know better their daily energy consumption level;
  - ✓ The right price signals that reflect the supply and demand situation and the competition. This implies eliminating artificial tariffs that don't reflect the energy market conditions;
  - ✓ Price rewarding systems for lower consumptions during peak hours when electricity is provided by gas fired CO_2 emitting stations. We mentioned above the large savings

enabled by dynamic demand response Utilities programs;

- ✓ CO_2 taxes are also a way to push customers to buy or use less CO_2 rich products. These taxes have already been implemented in several European countries including Sweden, Denmark, Switzerland and Finland as well as in Canada. According to some economists, they have enabled a "green industry" growth and contributed for 0.5% to the countries economic growth. Their effectiveness is however controversial as delocalization of polluting industrial activities are partly responsible for the observed CO_2 savings. In 2010, a carbon tax will be imposed in France on fossil fuel products. The tax will be based initially on a price of €17/tCO_2 and all the revenues generated by this new tax will be redistributed to the consumers.
- On the longer term, we all need to rethink our economic model and our lifestyle. A few years ago some developing countries announced that they would build their own economic growth model adapted to their history and culture. It is disappointing to see that adopting the Western lifestyle and accessing to the same type of living standards is now the common goal of many people in these countries.

  In our Western lifestyle, success is measured by the ability to buy a larger house, to drive a big car, to fly intensively around the world, to acquire a lot of manufactured goods and to consume a lot of energy associated with high CO_2 emissions. These individual incentives have to change and a more frugal, perhaps more intellectual, lifestyle should be considered as a goal.

Conclusion

After the crisis, in the developed countries, slow recovery and energy and CO_2 saving measures will probably modify the way companies and individuals consume energy.

On a global level, it is more than likely that a large part of the previous problems related to demographic growth and rising standards of living will re-emerge. To convince ourselves, we only have to remember that annual population growth in developing countries is 1.2% and that their annual energy consumption is expected to increase more (by 1.7%) because of standard of living improvement.

This is why it is absolutely vital that the reductions in energy consumption in the developed countries aim at compensating for the increase in the developing countries.

It is also necessary, during the crisis, to continue to invest not only in demand management, energy infrastructures but also in achieving the right energy production mix. It is the duty of governments to provide the right legislative framework and financial incentives to make sure that these investments continue. Otherwise, because electricity and gas are heavy industries requiring long periods of time to build new infrastructures, the problems which existed prior to the crisis will be exacerbated further.

Paris, October 20, 2009

Colette Lewiner

Global Leader of Energy,
Utilities and Chemicals Sector at Capgemini

Competitive Power

Generation

In the short-term, the continuing momentum in the construction of plants and the decrease in consumption due to the economic crisis have ensured a temporary security of supply

Investments in wind plants and gas turbines have supported the growth of the generation capacity in 2008

European generation capacity increased by 24.3 GW in 2008 (see Table 1.1). This represented an increase of 3.0%, which is slightly more than the 2.3% rate of 2007 and is mainly due to continuous construction waves in Renewable Energy Sources (RES) and gas-fired generation.

Two different patterns of growth in generation capacity can be seen:

- Mediterranean countries like Spain, Italy and Portugal have all increased their generation capacity by more than 5%; Latvia (+13.7%), the Netherlands (+13.5%) and Germany (+5.0%) have also fully contributed to the overall capacity growth;
- Other countries, like the UK (+0.7%), Eastern European (except Romania) and Nordic countries have low increases (below 1.5%) in their generation capacity, or even decreases like Denmark (-3.2%) and Switzerland (-0.4%).

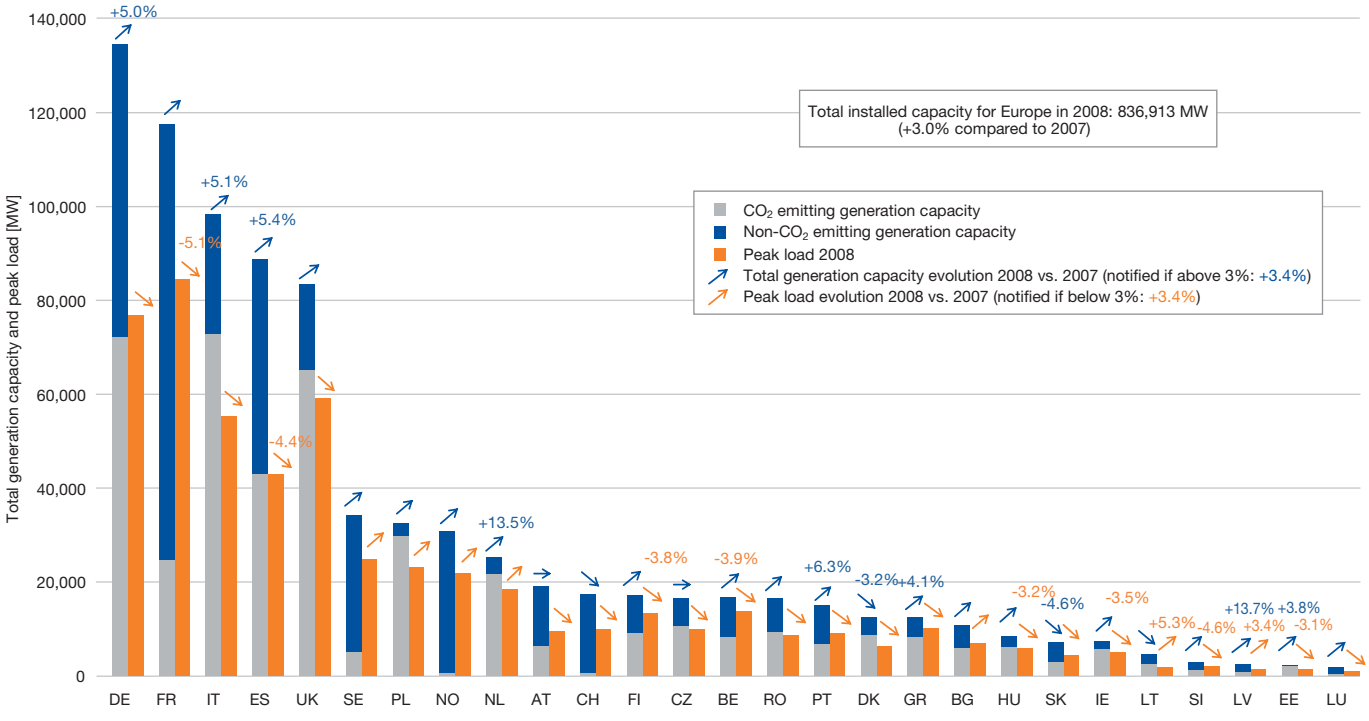
In 2008, gas contributed to 18% of the total European generation capacity with 11.1 GW added (+1.5 GW for Spain, +2.4 GW for Italy). Greece has commissioned new gas power stations (in particular the 326 MW Alouminio plant) to meet summer demands. Gas has become the main generation source in Belgium (+1.5 GW) ahead of nuclear energy.

Nevertheless, the highest increases and additions of generation capacity in Europe were due to RES with +14.0 GW. RES now represents 10.3% of European generation capacity:

- Wind power generation reached 23.9 GW in Germany and has been developing fast in Mediterranean countries (+10.5% in Spain, +37% in Italy and +33.1% in Portugal). Across Europe, wind growth pace stabilized in 2008 (+8.4 GW in 2008 versus +8.3 GW in 2007);
- Solar energy was equally booming with 4.6 newly-installed GW mostly in Germany and Spain.

Despite this construction of gas plants and wind farms, the European generation mix remained globally similar to the mix observed in previous years, with fossil fuel (52%) and nuclear (16%) still accounting for more than two thirds of total generation capacity in Europe.

Table 1.1 Peak load, generation capacity and electricity mix (2008)



Source: ENTSO-E, EirGrid, National Grid – Capgemini analysis, EEMO11

C. Lewiner (ed.), *European Energy Markets Observatory*, DOI 10.1007/978-94-007-0101-4_2,
© Springer Science+Business Media B.V. 2010

The economic crisis began to hit electricity demand from Q4 2008

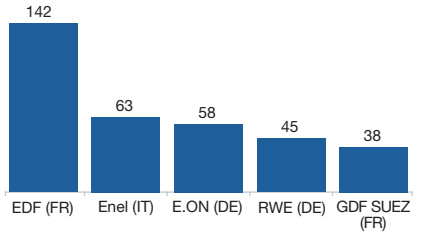
In 2008, the annual electricity consumption in Europe grew reasonably at +0.8% (against +0.9% in 2007). Three different groups of countries could be noticed:

- Annual consumption decreased significantly in Slovenia (-4.8%), Hungary (-2.6%), and Belgium (-0.5%); Italy faced its first drop (-0.7%) in electricity demand since 1981;
- Annual consumption growth rate declined but remained positive in Portugal (+0.8% – the lowest growth rate since 1993) and Greece (with an unusually moderate increase of 1.1%);
- High value growth rates have been measured in Western Europe as in the Netherlands (+3.4%) and France (+3.0%).

However, if the summer growth rate was positive at +2.4%, the winter (especially Q4 2008) electricity consumption rate turned negative in 2008 at -0.3% for the UCTE countries. It reveals the strong impact the economic crisis had on electricity consumption in Q4 2008 and even more at the beginning of 2009.

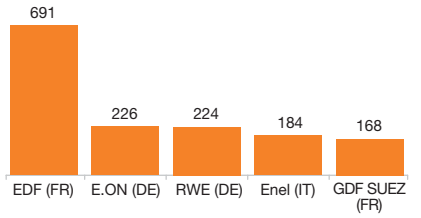
All European regions registered a strong reduction in electricity consumption, with some of the biggest drops occurring in Italy (-8.2%), in Spain (-7.2%), in the UK (-4.4%) in H1 2009 versus H1 2008. This was mainly due to a significant slowdown

Top 5 - Total installed capacity in GW (2008)



Source: Companies' annual reports - Capgemini analysis, EEMO11

Top 5 - Total electricity generation in TWh (2008)



Source: Companies' annual reports - Capgemini analysis, EEMO11

Operational Excellence programs are not only about cost cutting

Most of the major players (RWE, E.ON, EDF, GDF SUEZ, Enel, Vattenfall) are managing on an almost on going basis of cost optimization programs.

Drivers are mainly to improve their cash position especially in a more complex economic environment where demand is reducing and costs of operation are increasing. Also **inefficiencies and redundancies obviously exist** especially in large groups that have gone through acquisitions and need to take care of stabilization of the organization.

Focus is mainly on cutting direct costs (including purchasing and supply chain) **with some, but limited attention given to indirect costs** (support functions, corporate). Optimization of assets utilization is a key driver for generators to optimize the return on capital employed.

The regulated activities, transmission and distribution of power and gas are reaching higher level of efficiencies in their operations but are clearly under the pressure of the regulators.

Cost cutting exercises produce short-term significant results (around 2 to 3% of the cost base) **but can produce counter effects** by reducing critical activities such as preventive maintenance. **Cutting cost is not operating better with less resource.** Operational Excellence programs aim at optimizing all business processes with the participation of all employees. **True Operational Excellence programs** that are based on well known Lean Six Sigma methodologies **bear significant improvement potential** (from 15 to 20%) **when proper transformation of management is achieved.**

The power and gas industry do have these levels of productivity on hand. **Will increased regulation combined with proper competition be able to drive these efficiencies out of these organizations to the benefit of the end consumers?**

of industrial activities (-10% for Germany and -12.4% for France in Q1 2009 versus Q1 2008).

Unlike 2007, consumption has grown faster than peak loads in most European countries. Most national peak loads were recorded in early winter of 2008:

- Thirteen countries (like Germany, the Netherlands and Bulgaria) registered national peak loads during the cold waves that hit Europe in early January and mid February 2008;
- Seven countries including France and Spain hit their peak loads in late winter 2008, which were lower than in 2007;
- Greece and Italy registered their annual peak loads in the summer as happened in 2006.

Demand-Offer equilibrium is temporarily secured

The theoretical margin (percentage of difference between theoretical generation capacity and peak load) improved in 2008 at 37% (versus 34% in 2007) for EU-27 (see Table 1.2):

- Theoretical margin increased in Mediterranean countries like Spain (from 47% in 2007 to 52% in 2008) and Italy (from 39% to 44%) due to the combination of generating capacity rise (above 5%) and peak load decrease;
- France saw a significant rise from 23% to 28% in 2008 in its theoretical margin mainly due to a drop in peak load (-5.1%);
- Austria, Denmark, Spain, Romania and Lithuania kept their theoretical margins above 45%;
- Belgium and Greece had the lowest theoretical margins (less than 25%) in spite of significant improvements (from 13% in 2007 to 18% in 2008 for both countries); Finland stood at 22% in 2008 versus 19% in 2007.

The real margin (percentage of difference between real generation capacity – which integrates non-usable and unavailable generation capacities – and peak load) hugely improved in 2008 from 5.3% in 2007 to 9.2% in 2008 for UCTE countries due to decreases in peak loads and addition of capacity:

- The Netherlands (15%), Spain (13%) and Germany (11%) recorded high margins;
- Austria (21%), Denmark (14%), Sweden (13%) kept their real margin high (though decreasing compared to 2007);
- France saw a significant improvement from -5.7 to 1% of its real margin despite 12 to 15 nuclear plants being offline from July to September;
- The UK improved its real margin from 2.2 to 6.2% due to new peak load capacity added;
- In spite of an additional generating capacity of 0.5 GW in 2008, Greece's negative real margin remained (-5.0%) as strikes in March caused outages of generation units;
- Belgium experienced high level of simultaneous plants unavailable during the year and imported up to 35% of its peak load in March and April leading to a worse real margin at -13% compared to 7% in 2007.

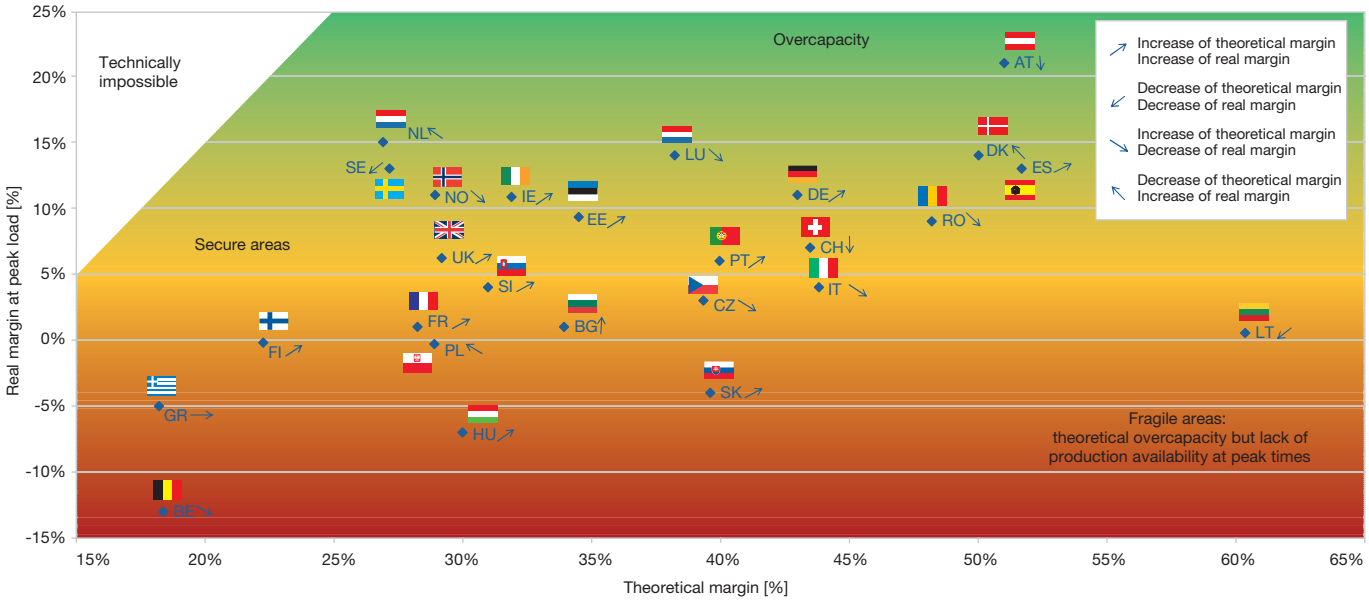
The power balance was challenged in the first half of 2008 especially in the UK which faced unplanned outages at nine power plants in June.

Tension eased in the summer thanks to mild temperatures, high wind input and high level of rainfall. However the situation changed at the end of August and September. Low levels of spare capacity from conventional plants and a drop in hydro and wind put pressure on generation adequacy at the end of August. Then, the fall of electricity demand during Q4 2008, as a consequence of the economic crisis, relieved the tensions.

At the beginning of 2009, a tight supply was experienced in a few countries when a cold wave hit Europe in early January:

- France set up a new national peak load at 92,400 MW and had to import around 1,000 MW for several consecutive days mainly from Germany; local blackouts therefore threatened Brittany and South East French regions at that time;
- No particular stress on the generation-load balance was recorded in the other countries because of the reduction of demand. This trend continued over Q2

Table 1.2 Real margin versus theoretical margin (2008)



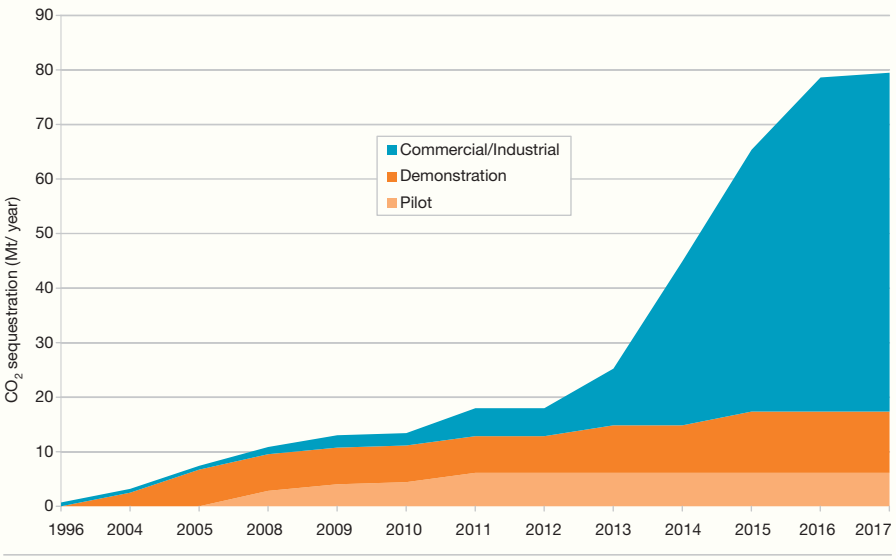
Source: ENTSO-E, EirGrid, National Grid – Capgemini analysis, EEMO11

Carbon Capture and Storage (CCS): better but still not enough

As part of the European Union (EU) Global Climate deal meeting in December 2008, it was agreed that **300 million EU ETS allowances would be allocated to 12 viable CCS commercial demonstration projects in Europe. Governments are also beginning to introduce direct subsidies for research and development of CCS projects.** The UK is leading the way with a government competition for four CCS demonstration projects, although no money has been spent yet.

The European Commission (EC) has also dedicated €1.05 billion from its €3.98 billion recovery plan **to 13 CCS projects in seven Member States.** But EU funds for CCS are not enough to cover what is really needed. The demonstration facilities could cost €12 billion to build and operate.

European CCS projects development since 1996



Source: IEA, IDDRI, Zero Emission Platform – Capgemini analysis, EEMO11

Germany and Netherlands have had setbacks as the public is not accepting CCS in their neighborhoods. Regulation was not approved in Germany. The Vattenfall CCS project was expected to operate in 2009 but was cancelled due to public opposition. The same happened in the Netherlands with Shell.

In 2008, CCS activity in Europe has been increasing but more needs to be done.
Three CCS projects started their operations in 2008: Ketzin in Germany; Schwarze Pump – a Vattenfall plant in Germany; and injection also started at the Snøhvit plant in Norway. Four additional ones started in 2009: Immingham in the UK led by ConocoPhilips, Grosskrotzenburg led by E.ON and Siemens, Niederaussem led by RWE, both in Germany and Lacq in France led by Total.

Of the 50 reported projects up to 2017 and beyond, 20% are pilot projects (1-50 MW), 10% are demonstration projects (<200 MW), and 70% are commercial / industrial projects. However, **even if all the announced projects were to go forward this represents the annual avoidance of only around 80 million tons of CO_2 per year by 2017 which is less than 4% of global ETS allowances** which accounts for two billion tons.

Currently investments in CCS projects are mostly at the planning stage, and the capital that actually remains is limited. A total of €450 to 500 million is being spent on projects that are in operation. **Most of the announced €10 to 12 billion for commercial/industrial-scale projects are at the feasibility study stage, and the final investment decisions are not expected until after 2010.**

2009 except in France which was affected by unplanned nuclear units' shutdowns in June.

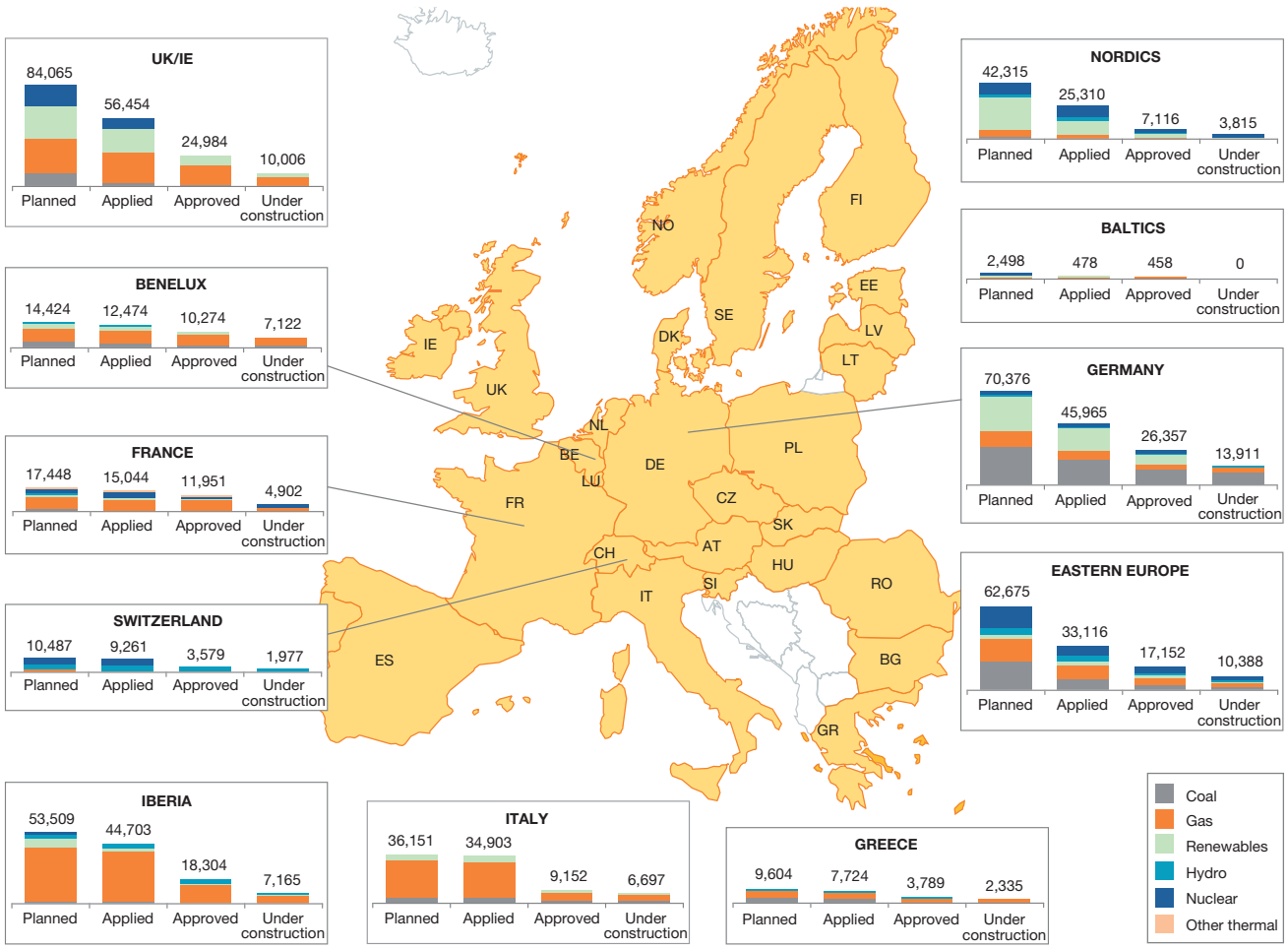
In the mid-term, investments have remained high in H1 2009 despite the crisis

Investments in gas are greater than coal which are also increasingly challenged by nuclear

In 2008, investments in electricity generation followed the same increasing path as last year mostly driven by gas and RES (see Table 1.3):

- Gas still accounts for almost 40% of European investments in generation led by the growth in Mediterranean countries, the UK and Benelux. Iberian countries have indeed more than 40 GW of gas planned and Italy will almost have 27 GW;
- Coal keeps its stronghold as base load assets reaching 28 GW planned in Germany, and 22 GW in Eastern Europe, notably Poland. Companies like RWE are also undertaking coal plants renewal programs replacing old plants like the Boa G and F units at Neurath instead of three units at Frimmersdorf;
- Nuclear revival has accelerated in 2008 in the Nordic countries (Finland and Sweden), Eastern Europe, France and the UK and represents close to 14% of planned investments in terms of capacity. The UK has registered a dramatic growth with at least four reactors planned;

Table 1.3 Map of generation capacity projects (MW), as of July 15, 2009



Note: Planned=announcement of intent; Applied=main permits applied for; Approved=contracts and financial go-ahead pending; Under construction=ground has been broken
Source: Platts PowerVision – Capgemini analysis, EEMO11

Finland has three reactors planned; and France has two planned;

- RES (excluding hydro) maintain their growth and still reach 24% of total generation projects: Nordic countries, Germany and the UK have more than 20 GW planned each.

Although the crisis has hit European electricity markets from Q4 2008 onwards, investments have kept at a high level in 2008 and H1 2009 supported by investment growth in Germany, the UK and Eastern Europe. The low impact of the crisis on short-term investments tends to highlight a relative inertia of the sector.

Investments in Germany and in the UK remain necessary for ageing plants replacement reasons. Plants decommissioning expected in the coming years are above 25 GW in each country, mainly in coal and nuclear. Planned investments so far enable both countries to secure long-term security of supply. In Eastern Europe, economic development, tight margins at peak loads, and the needs for base load assets call for a sustained level of investments in coal and nuclear. The high level of planned investments is also due to announcement effects since only 70% of planned investments have applied for main construction permits, the other 30% (over 100 GW) remains as announcements of intent. The UCTE revised down its prospect from 50 GW to 20 GW of additional investments in capacity needed to secure the equilibrium by 2020, providing currently planned investments are not cancelled which can be challenged by the crisis. Only Eastern Europe and Italy need higher extra investments to maintain generation adequacy after 2013.

However, there are alarming signs of a plunge in investments in the coming months according to experts' consensus and notably the OECD and the IEA[13]

Many projects are being postponed if not cancelled, notably in Spain where three CCGT plants were cancelled in 2008 and ten others delayed in March 2009 (a total of more than 7.5 GW). In France, four CCGT projects have applied for permit in 2008 and early 2009, while only one project was brought online and three projects were postponed or cancelled during the same period.

- The financial crisis, which includes a credit crunch, is jeopardizing project financing. Despite decreasing construction costs both for units and equipments, which reversed the trend observed in past years, investments are seriously being threatened by the increasing cost of debt;

[13] The Impact of the Financial and Economic Crisis on Global Energy Investment, OECD/IEA, May 2009

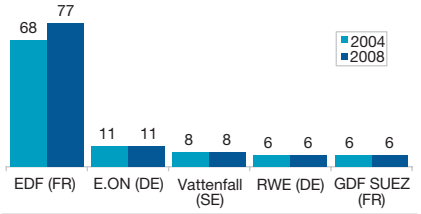
- The economic crisis, which is hitting the industrial activities very hard across Europe, reduced industrial direct investments in power generation. Consequently, current spare capacity has increased uncertainties about the volume of investments needed to secure supply and has thus slowed down investment. Capacity could then be affected by a delay in time and could led to shortage in the long-term;
- A strong upturn of investments after the crisis is not guaranteed and could be insufficient as consumption restarts. In France, RTE stated that security of supply was guaranteed for the coming years helped by the crisis but issued a warning that from 2015 if an extra 1,800 MW is not built to meet peak demand then supply security could be affected;
- In addition, plants decommissioning should rise with the Integrated Pollution Prevention and Control Directive (IPPCD) and the Large Combustion Plant Directive (LCPD) which were adopted in December 2008. They aim to limit emissions of pollutants like sulfur dioxide, nitrous oxide and dust and require the closure of numerous plants. Closures are estimated at 8,000 MW of generating capacity by 2016 in the UK. Spain will have to shut down at least 13 units for a total capacity of 3.3 GW.

Several big Utilities have cut their investment plans because of the crisis and falling energy demand. Iberdrola has announced 2009 investments of €4.5 billion down from €13 billion in 2008. Gas Natural-Union Fenosa will significantly cut investments from the previously announced €21 billion down to €11-13 billion and E.ON from €36 billion to €30 billion.

Coal suffered a contrast year and was particularly challenged by legislation

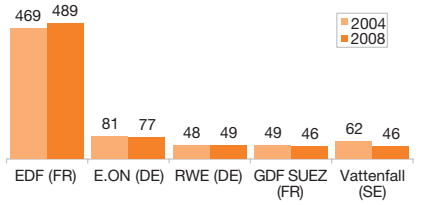
Coal has faced rising and strong local opposition since 2007 especially in Germany's Kiel and Staudinger areas. European and national legislation, as well as the crisis, have increased difficulties for building coal plants.

Top 5 - Nuclear installed capacity in GW (2008)



Source: Companies' annual reports - Capgemini analysis, EEMO11

Top 5 - Nuclear electricity generation in TWh (2008)



Source: Companies' annual reports - Capgemini analysis, EEMO11

Towards a better integration of wind power on transmission grids

Integrating large wind farms is a real challenge since wind energy is not easily predictable. Several issues have to be addressed, locally but also at the European level:

- **Availability and reliability:** large offshore wind farms need to demonstrate robust availability ratios in order not to add further uncertainty to grid balancing (e.g. asking for additional spinning reserves) and market operations;
- **Power quality:** High Voltage Direct Current (HVDC) lines are more and more used (instead of standard Alternative Current (AC) lines) especially for offshore wind farms since they reduce transmission losses. However HVDC lines may require several converters (AC/DC and DC/AC) which may be the source of disturbances (generation of harmonics, slow frequency fluctuations in weak distribution grids);
- **Ancillary services:** Usually wind farms were not requested to contribute to grid frequency and voltage control. As a consequence of the limited predictability of wind power, additional back-up reserves are needed to deliver power when the wind is not blowing. With wind power representing close to 8% of total European installed capacity, time may have come for wind operators to comply with the same system rules as the other conventional generators;
- **System reliability:** some wind generators may be tripped off the system when a fault occurs, but those located at the end of a network branch such as offshore farms cannot be brought online again if they are not fully integrated in regional grids models;
- **Cross-border capacity:** more wind capacity means more interconnection capacity locked for system reliability purposes, hence less capacity available for commercial transactions.

For a large scale integration of wind power in Europe more back-up capacity will be needed to compensate for generation uncertainties. New conventional plants could be built (gas generation) but a better solution would be to increase cross-border capacity and share back-up systems and thus decrease the need for building additional capacities.

In any case, daily grid operations influenced by wind forecasts, grid congestions and system planning should become the EU wide issues that require more coordination.

- Only a few new projects were registered in 2008 except at Wilhelmshaven, Datteln and Karlsruhe in Germany. In 2009, planned investments in coal projects remained high because of renewal programs to replace ageing plants. There are increasing doubts about confirming these investments considering the low power prices and demand slump;
- The LCPD naturally threatens coal plants which have heavy SOx and NOx emissions. In France, 3.6 GW, most of which are coal plants, will have to be decommissioned. Tightened national or local environmental legislation has also added complexity to many projects. For example, after several months of struggle, Vattenfall is close to obtaining the required water permit for its Hamburg-Moorburg plant;
- The EC has also decided to strongly support CCS. It appears to be an opportunity for the future coal plant development considering the restrictions on CO_2 emissions and its price but it is also an additional constraint on the short-term. The debate is open over obliging new plants to be capture-ready as in the UK.

Despite high volatility, clean spark spread was slightly favorable to clean dark spread in the summer 2008 because of high coal prices and of the cost of CO_2 emissions. Clean dark and spark spreads were both particularly high in September and October before decreasing sharply. Their fall continued in 2009, clean spark spread becoming more attractive in Q2 2009 after difficulties at the end of Q4 2008 and Q1 2009 which hurt new CCGT announcements. Gas-fired generation keeps the lead over coal-fired generation mainly due to capital costs, uncertainties around carbon prices, legislation and lower power prices.

Intensive in capital, investments in RES remained high

Europe's electricity Utilities are looking forward to de-carbonizing Europe by 2050 by relying on RES but also on nuclear and new technologies like CCS.

Despite the fears about the consequence of the credit crunch on high capital-intensive RES (especially wind), investments have remained high. They are still supported by the EC and by national legislations. The new ETS will deliver emissions in 2020, 21% below the level of 2005 whereas several governments raised their targets in terms of electricity production from RES by 2020 (e.g. at 35% for the Netherlands):

- Offshore wind has confirmed its boom especially in the UK including the 630 MW London Array project. The UK has tendered for Round Three of the offshore wind farm development program which aims at adding up to 25 GW of offshore wind. Total planned investments in wind remain high as in Spain where wind generation is expected to reach 28 GW installed by 2015 from 16 GW as of end 2008;
- Eastern Europe and Portugal have maintained ambitious hydro investment plans. In Portugal, four dams on the Douro River are expected to generate a total of 1,100 MW by 2018. Competition over dams is even likely to be harsh especially in France since the government issued a new hydro plan encouraging operators beyond EDF and GDF SUEZ to tender for operating French largest dams.

Technologies like CHP and CCS have been supported by legislation and projects are booming

After the first moves made last year, the EC and national governments have taken further actions to favor the development of clean technology.

- Combined Heat and Power (CHP) projects have grown significantly across Europe especially in Northern Europe: it already represents up to 50% of generation in Denmark, 30% in the Netherlands and 12.5% in Germany with a target of 25% by 2020 supported by a CHP law ensuring bonus payments;

Energy storage, a key piece to smart grids and flexibility

To mitigate climate change, the EU has adopted the 3x20 objectives and aims to lower the share of fossil fuelled generation in the mix, but it is not an easy task. Fossil fuelled generation can easily adapt to any demand profile, which is not the case of renewable and nuclear generation. According to a Capgemini study[a], complying with the 20% objective of renewable energy by 2020 may result in adding 300 to 380 GW of intermittent electricity, which would need 200 to 300 GW of back-up capacities. **This back-up could be the existing fossil fuelled generation capacities (but they emit CO_2), aggregated demand response (high potential of up to avoided 50 GW capacities by 2020 for EU-15) and energy storage.**

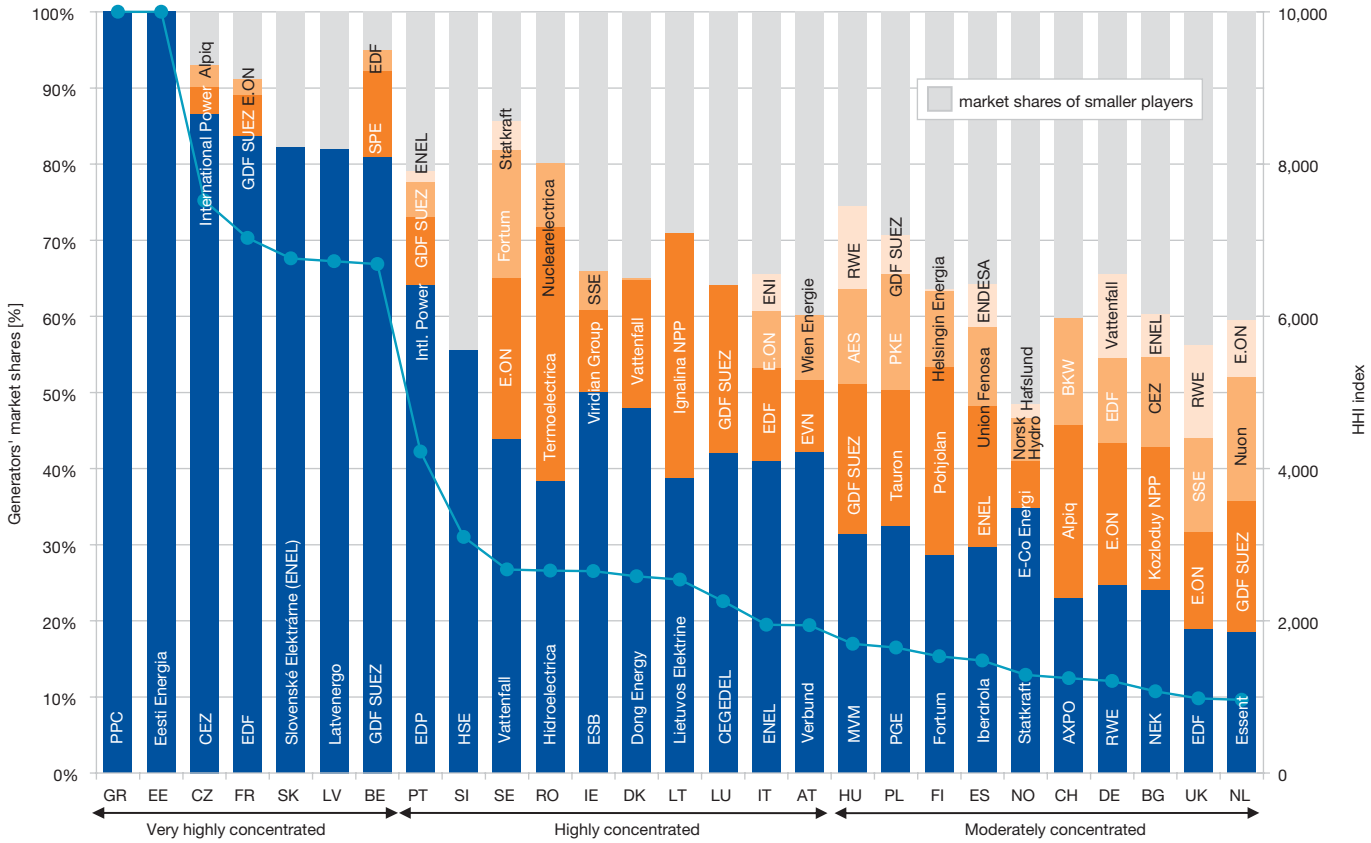
A variety of technologies are involved from low storage capacities of about a kW (for household purpose) **to high capacities of several hundreds MW** (transport and distribution purpose), **from short storage times** (under the second) **to long storage times** (a year). Despite the fact that costs often remain high, storage may provide solutions to different needs: balancing the variability of wind and solar electricity or the rigidity of nuclear generation, but also providing voltage control and reserve capacity.

The storage solutions includes lakes and pumped hydro (typically €10 c/kWh for both storage and re-injection), **many types of electrochemical batteries** both for stationary uses and vehicles-to-grids (typically €50 c/kWh), **compressed air in cavities** (typically €10 c/kWh), **flywheels, supra-conductors, super-capacities** (typically €100 c/kWh), **thermodynamic storage, hydrogen and fuel cells.**

The flexibility of the grid also comes from old solutions as coupling electricity with thermal hot/cold energy storage. Device load control will help home water heating tanks to become a full part of the smart grid, and to provide dynamic balancing services to the grid.

a) Demand Response: a decisive breakthrough for Europe, How Europe could save Gigawatts, Billions of Euros and Millions of tons of CO_2, Capgemini, VaasaETT, Enerdata, May 2008

Table 1.4 Generation market concentration (2008)



Source: Companies' annual reports – Capgemini analysis, EEMO11

- As for CCS, the business case appears to not be competitive enough without financial support according to the big Utilities and investors. Consequently, the EC is financing CCS tests and giving free 300 million EU allowances in the next ETS (see Box on CCS) so that several CCS demonstrators are moving forward.

Assets swaps and consolidation continue in line with different Utilities' strategies

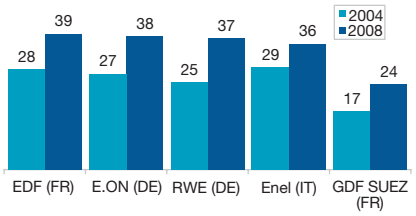
Consolidation has slowed but several significant takeovers have occurred in the UK, Spain and the Netherlands:

- EDF acquired British Energy to strengthen its leadership in nuclear production and to lead European Utilities to take advantage of the nuclear renaissance;
- Vattenfall acquired Dutch Nuon to reinforce its low carbon assets in wind, hydro and CCS projects development;
- In Spain, Gas Natural took over Union Fenosa to reinforce its market share (17% for the combined group) and its generation capacity to 18.2 GW;
- German player RWE has achieved the integration of Essent in Q3 2009 so as to enter the Dutch market (and benefit from its position as a hub) and boost its renewable activities.

This market consolidation, as well as the record level of asset swapping seen this year, answers the electricity suppliers' will to fund their long-term investments, to reach a critical competitive scale, and to balance their portfolios (see Chapter Finance and Valuation).

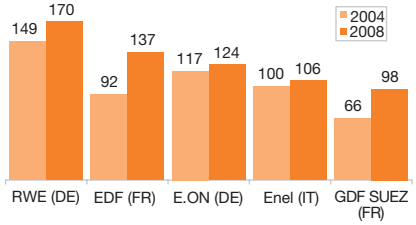
Generation market concentration (see Table 1.4) remained high in 2008 with few changes compared to last year except for the Netherlands and Spain, with decreases in concentration respectively due the rise of E.ON and Enel, and for Ireland where the regulator asked the incumbent ESB to divest/close generation capacity in order to increase competition.

Top 5 - Fossil-fueled installed capacity in GW (2008)



Source: Companies' annual reports - Capgemini analysis, EEMO11

Top 5 - Fossil-fueled electricity generation in TWh (2008)



Source: Companies' annual reports - Capgemini analysis, EEMO11

In the long-term, a nuclear revival is expected in a majority of European countries

Europe has been experiencing a paradox when it comes to long-term generation. Indeed, the need for the renewal of base load capacity was hidden behind the focus made on RES and peak load assets as CCGT. Together with this reality, plants decommissioning driven by the LCPD and nuclear phase-out laws has worsened the problem of security of supply in the future.

Progressively aware of this imbalance, European leaders and investors have been intervening in favor of investments focusing on mid- and long-term generating capacities. 2008 and 2009 showed how nuclear has taken center stage in countries' energy strategies. Nuclear phase-out policies have been questioned and lifespan extensions have been brought under the spotlight. Nuclear generation is now considered in some countries as a critical means to reduce CO_2 emissions.

However, current energy mixes, lobbies (consumers, green and industrial associations, and suppliers), local pressure and, more recently, economic uncertainties have influenced the European states' position towards the way they face long-term energy challenges differently.

Three main groups have emerged that are distinct given their long-term strategies and their future output mix.

Strategy based on nuclear with nuclear plant construction planned or underway

- Finland is building the first EPR project in Olkiluoto and two others are planned;
- France is doing the same at Flamanville and has made steps toward the construction of a second one at Penly in Normandy. As far as nuclear reactors' lifetime extension is concerned, the French Nuclear Safety Authority issued its judgment in favor of authorizing another ten years operation for the country's 34.9 GW class power reactor fleet;
- Central and Eastern European countries have also been planning nuclear reactors' construction. Slovakia has paved the way as price negotiation at Mochovce's site is nearly complete and construction of a new reactor will be launched in 2013 at Bohunice;
- In the UK, procedures have been accelerated. The selection of sites where nuclear plants are to be built progressed rapidly (Bradwell B, Dungeness C, Hinkley Point C, Sizewell C, and Sellafield). Due to the massive investments required to finance the UK's nuclear ambitions, Utilities have decided to form consortia to develop nuclear capacities: E.ON UK-RWE nPower, Iberdrola-SSE-GDF SUEZ and British Energy-EDF-Centrica are the three leading consortia. In the meantime, the UK continues its dash for gas;
- Switzerland has been struggling to find a compromise for its energy policy which aims at reducing its dependency on imports and avoid an electricity supply shortage in the mid-term. Three applications totaling 4.8 GW were made to replace its oldest nuclear plants but the authorization procedure has been slowed down by the constant fight of interests between Axpo, BKW and Alpiq and the political indecision to know how many nuclear power stations were needed. Until nuclear production comes online, RES and CCGT appear to be a transitional solution even if the Swiss Senate voted on June 2009 for a 500 MW limit of CCGT's generation;
- Italy is to return to nuclear power through the impetus given by the Economic Development Minister, backed by the Confindustria association and Enel. A law enabling the set up of a country's nuclear development framework has been approved by the Italian legislature. The construction of a new reactor is expected to begin in 2013 and could lead the way in reducing the country's generation portfolio reliance on oil and gas. EDF and Enel have already signed an agreement for the forthcoming Italian nuclear development;
- Similarly, in Sweden, the government has made it possible to lift a legal ban on building nuclear reactors as it desires to renew its ageing fleet by a new fleet to be constructed on the existing nuclear plant sites.

Cutting or delaying nuclear phase-out policies to diversify their energy mix and secure long-term energy supply

In Germany, despite a long-term strategy focusing on RES and gas, pro nuclear lobbies and political parties such as CDU/CSU have been pushing ahead to mobilize public opinion and authorities to reverse the nuclear phase-out law and extend lifespan of nuclear reactors of the country. Now that the CDU/CSU-FPD coalition has won the September 2009 elections, it is very probable that the law will be changed in the short-to-medium term. Meanwhile, high sums are still invested in coal plants to be used as base load supply even if national opinion advocates clean coal instead. The country continues to invest significantly in gas and RES generation. A renewable law giving premium feed-in tariffs rates for wind, biomass and solar power from 2009 onwards confirms the country's will to reach a higher share of green sources in its generation portfolio mix.

In Belgium, the government has decided to delay by 10 years the first stage of phasing out nuclear plants. Three reactors (Doel 1 and 2 and Tihange 1) out of the seven in the country should have ceased operations in 2015 but according to the "group of experts on the energy mix" (GEMIX), closing them would have led to a supply shortfall.

Dismissing the nuclear option and continuing the development of RES and gas power stations

Portugal expects to double RES generation capacity and total electricity production between 2006 and 2010 to meet increased demand, reduce imports and compensate the decommissioning of oil-fired plants. The main focus has been to expand hydro and wind capacities due to huge planned investments that would meet the country's ambitions to be an electricity exporter by 2020.

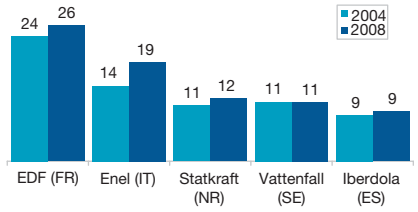
Spain's government confirmed its sponsorship for renewable and gas production to satisfy current and long-term electricity needs. Once again this year, the country is leading Europe's wind new electricity output greatly favored by national subsidies towards RES development. However, industrial lobbies' pressure to find a compromise in Spanish generation mix including a higher proportion of nuclear generation has been growing for the past months and the government has been considering the lifespan extension of at least one nuclear reactor, the 466 MW site at Santa Maria de Garoña.

Having not yet defined a clear long-term strategy and particularly whether nuclear power should be part of the fuel mix

Austria wants to reduce its gas dependence. The gas crisis in January 2009 – interruptions of deliveries of Russian gas – has crystallized its need to diversify its output portfolio and urgently set up energy policies. On the other hand, environmentalists have been criticizing the government for its lack of commitments for RES expansion other than hydro.

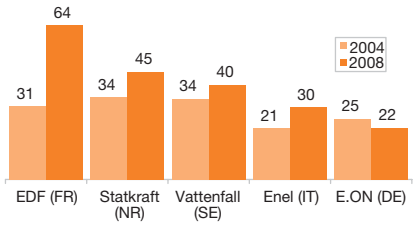
From its current status of net electricity importer, the Netherlands have the ambition to reverse the situation and become a net electricity exporter due to accelerating development of large scale generation facilities and its geographic location which converts it in a transit hub of coal, gas and water. If all its construction projects (including additional nuclear plant at Borssele) are completed, the surplus capacity could reach 13 GW by 2015.

Top 5 - Hydro installed capacity in GW (2008)



Source: Companies' annual reports - Capgemini analysis, EEMO11

Top 5 - Hydro electricity generation in TWh (2008)



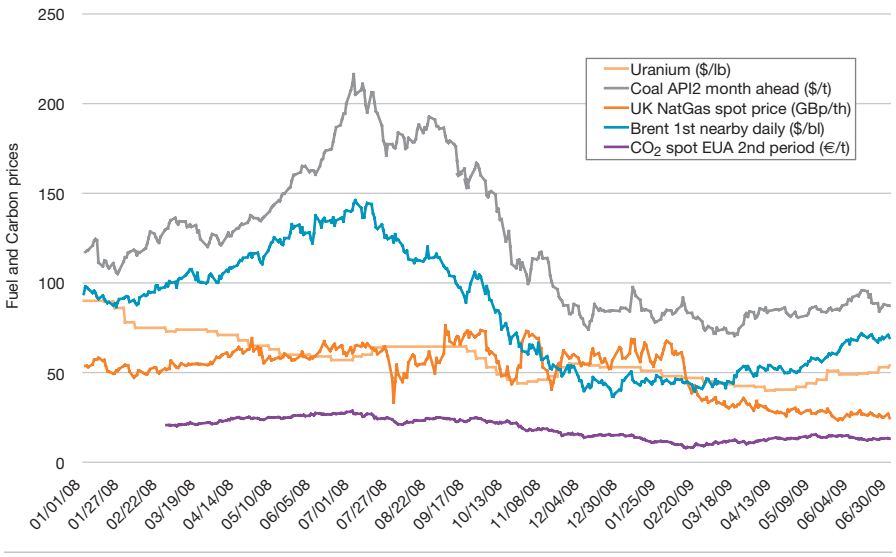
Source: Companies' annual reports - Capgemini analysis, EEMO11

Electricity Wholesale Markets

Power prices are driven by the prices of fuels and carbon (see Table 2.1):

- **Oil prices:** the price of oil (Brent) rose regularly from US$100/barrel in January 2008 to US$147/barrel in July 2008, and then fell continuously to reach the US$45/barrel area at the end of year. In H1 2009, it increased from US$45 to US$70/barrel. The main drivers for the oil prices remained the world supply and demand balance, and in particular the demand of the developing countries such as China and the production quotas of OPEC. Financial actors contributed to the roller coaster movement of 2008, either by using oil as an investment vehicle or for speculative purposes. The market shifted its view from a short-term tight market in the summer 2008 to a long-term tighter market with a positive difference of US$15/barrel for a five year ahead contract compared to spot in July 2009;
- **Gas prices:** see the Chapter Gas Wholesale Markets;
- **Coal prices:** coal prices on the ARA (Amsterdam-Rotterdam-Antwerp) hub followed a similar pattern to that of oil prices, also driven by the world supply and demand balance. China reduced coal exports in 2008 and Australia faced severe logistics issues. In addition, freight prices emphasized the roller coaster movement. Average coal prices jumped by more than 60% compared to 2007 with a peak in July 2008 at US$216/ton. Since the beginning of 2009, spot coal prices moved within the US$70 to 90/ton range. In H1 2009, long-term prices stayed higher than spot prices, which showed that the market is concerned about the future;
- The €/US$ exchange rate attenuated for European players the 2008 movements of oil and coal prices.
- **Carbon valuation:** see the Chapter Sustainable Energy and Climate Change.

Table 2.1 Commodity prices (2008 and H1 2009)



Source: SG Commodity Research – Capgemini analysis, EEMO11

European average spot prices for 2008 rose significantly (+70%) compared to 2007, mainly influenced by the surge in fuel and carbon prices during the summer of 2008. Those prices then fell during the winter 2008/2009 in response to the falling fuel prices and reduced demand

Average spot prices for 2008 were approximately 70% higher than in 2007 (see Table 2.2), with the UK increasing the most and Italy and Spain showing the lowest increase. Italy (€87.0/MWh) stayed the most expensive, closely followed by the UK (€86.7/MWh). Nordic countries with €46.9/MWh remained in the cheapest range, beaten only by Slovenia (€44.1/MWh). Germany was at €65.7/MWh and France at €69.0/MWh.

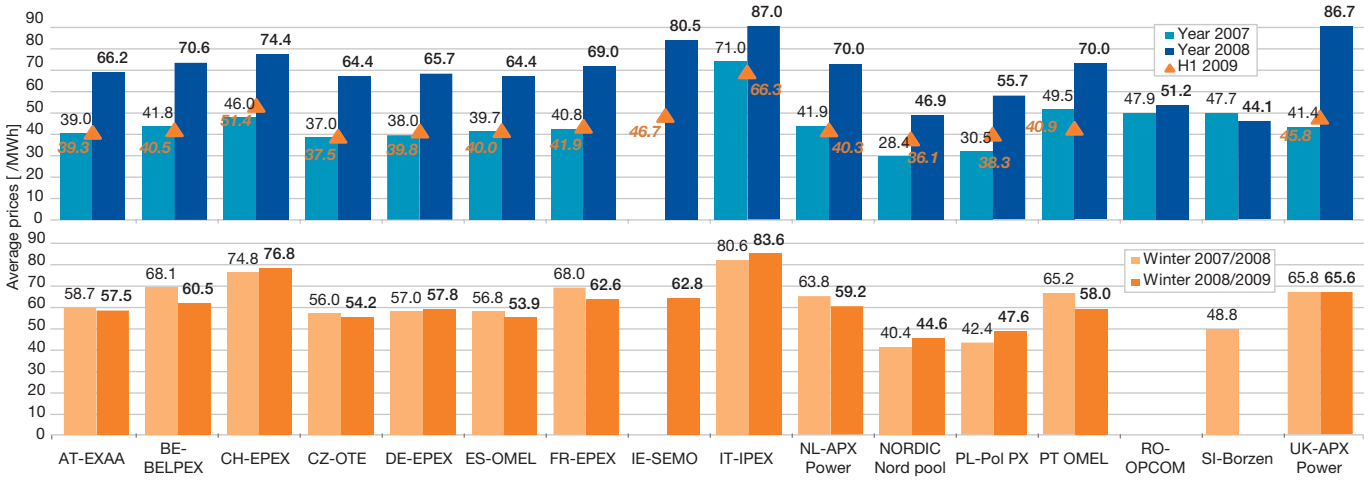
The winter 2008/2009 prices in comparison to winter 2007/2008 prices stayed in the +/- 10% range with Poland showing the highest increase and Portugal showing the largest decrease. The France, Belgium, Netherlands coupled market zone showed an 8.7% decrease as no significant price spikes occurred in the winter 2008/2009, whereas the Nordic market rose 10.4% due to some plants being unavailable in Q1 2009.

European spot prices in 2008 showed an unusual pattern (see Table 2.3) with the autumn months setting all time records for monthly base load average in Germany (€87.6/MWh) and France (€91.2/MWh). Prices during the summer of 2008 have more than doubled compared to the summer of 2007 reflecting the surge in the prices of commodities.

The rise in the carbon price further supported the year-on-year increase of spot prices. In 2007, the price of a carbon allowance stayed below €5/ton whereas in 2008 it fluctuated between €10 and 30/ton. The impact on spot price is dependent on the type of generation operating marginally for a country, and ranges from 50 to 100% in €/MWh.

2008 was the first year that the European LCPD (Large Combustion Plant Directive) was in force. It had limited consequences on spot prices, except in the UK.

Table 2.2 Yearly (2008 and 2007) and winter (07/08 and 08/09) average electricity spot prices

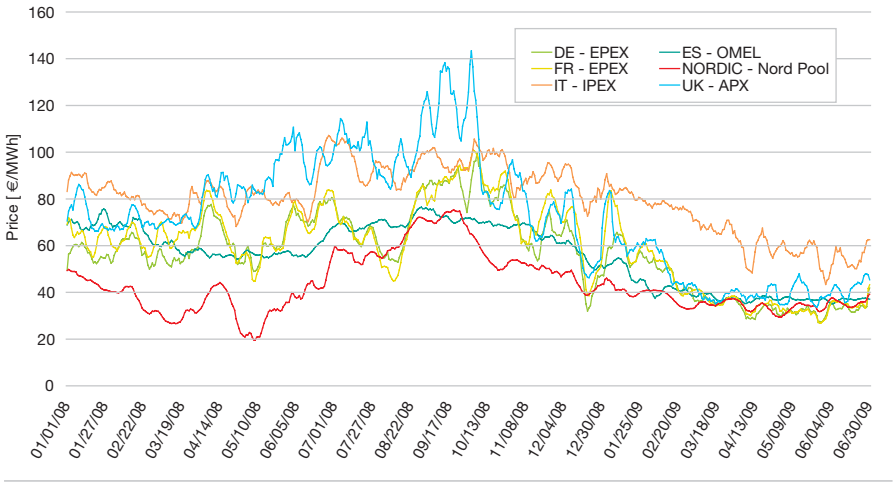


Source: Power Exchanges web sites – Capgemini analysis, EEMO11

Spot power prices are also impacted by the demand-supply balance:

- **Availability** of generating units has an impact on the marginal plant, and thus on price;
- **Hydro conditions and levels** have more or less impact depending on the share of hydro in the countries' energy mix as well as the consequences on coal logistics and the cooling of plants;
- **Mild weather** reduces the use of air conditioning in the summer, heating in the winter and energy requirements for cooling of nuclear plants in the summer (in addition to saving carbon emissions);
- **Industrial output** in a global crisis, with factories on temporary shut-down, leads to a lower demand and thus lower spot prices;
- **Wind** has some impact on spot prices, in particular in Germany and Spain where the installed capacity is of significance compared to demand;
- **Interconnections** when not congested give a country access to neighboring countries.

Table 2.3 Electricity spot prices on the main European markets (2008 and H1 2009)



Source: Power Exchanges web sites – Capgemini analysis, EEMO11

After the winter 2008/2009, European prices converged in an unstressed European system with no interconnection being significantly congested as previously experienced from time to time. Over the course of 2008 and in early winter 2008/2009, each market experienced some divergence due to its specificities and eventual spreads differences.

Continental power

Availability of nuclear in France and Germany was poor in comparison to the last five years. In France, generic defaults entailed additional maintenance and in Germany Brunsbüttel and Krümmel needed some repair after incidents in June 2007.

Hydro levels remained above average in France in 2008, even setting records in the summer of 2008 and in 2009. Swiss hydro reservoirs were used quite intensively in the winter 2007/2008 as well as 2008/2009, reaching low levels at the end of winter and high levels in the autumn.

France saw record consumption for five days in a row in early January 2009 with a 92.4 GW maximum load which was a 4.2 GW increase from the previous record of December 2007.

UK

Numerous prices spikes occurred in 2008, mainly linked with some generation availability issues. For example on May 27, 2008, nine unplanned outages in the UK necessitated an emergency signal by the TSO. Four British Energy units (approximately 2.4 GW) were unavailable for most of 2008 following a shutdown in October 2007 for a generic fault. Because of the LCPD, some coal units were not available as they were being upgraded with Flue Gas Desulphurization (FGD), as for example Rugeley (1 GW) which was offline for four months.

Scandinavia and Spain

Spanish and Nordic prices showed different spot price patterns from the rest of the continent due to local market fundamentals and congestion at the interconnection. Wind production in Spain increased by 26.4% in 2008. On March 5, 2009 the record injection of wind energy was reached in Spain with 11.2 GW. The Scandinavian hydro situation was better in 2008 than in 2007 thanks to heavy rain and snowfalls.

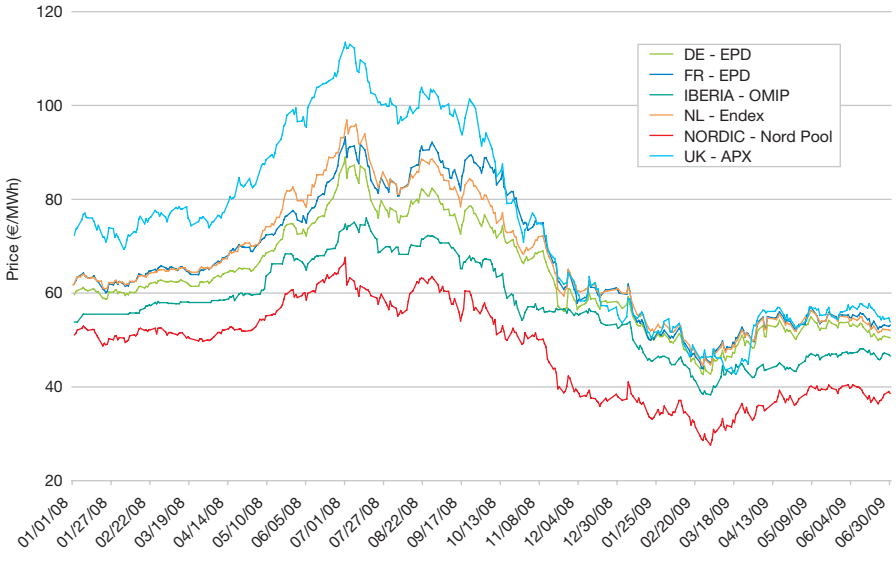
The 700 MW NorNed cable, connecting Norway and the Netherlands started operations on May 6, 2008. Use-it-or-lose-it capacity was attributed via daily explicit auctions in hourly bids. In H1 2009, power flowed from Norway to the Netherlands two thirds of the time, allowing the Dutch market to benefit from cheap hydropower from Scandinavia. Nevertheless, the market saw the Dutch prices stay strongly linked to continental prices.

Forward prices followed commodity prices in 2008, setting all time records in the summer of 2008. In 2009, they converged in Europe in the €50-55/MWh range with the exception of Scandinavia and Spain which stayed lower as isolated price peninsulas

Forward power prices are driven by fuel and carbon prices and market behaviors. The Calendar 2010 Baseload products moved parallel between the main European countries (see Table 2.4) with the Scandinavian zone being the cheapest. All curves reproduced the movement of the commodity prices (oil, gas, coal and carbon in €/unit), thus establishing all time records in July 2008: for example €90.7/MWh in France and €89.0/MWh in Germany. The UK price strictly followed the gas and carbon prices, making the clean spark spread fairly stable. Moreover, 2008 was characterized by high volatility linked to the high uncertainty in fast moving markets.

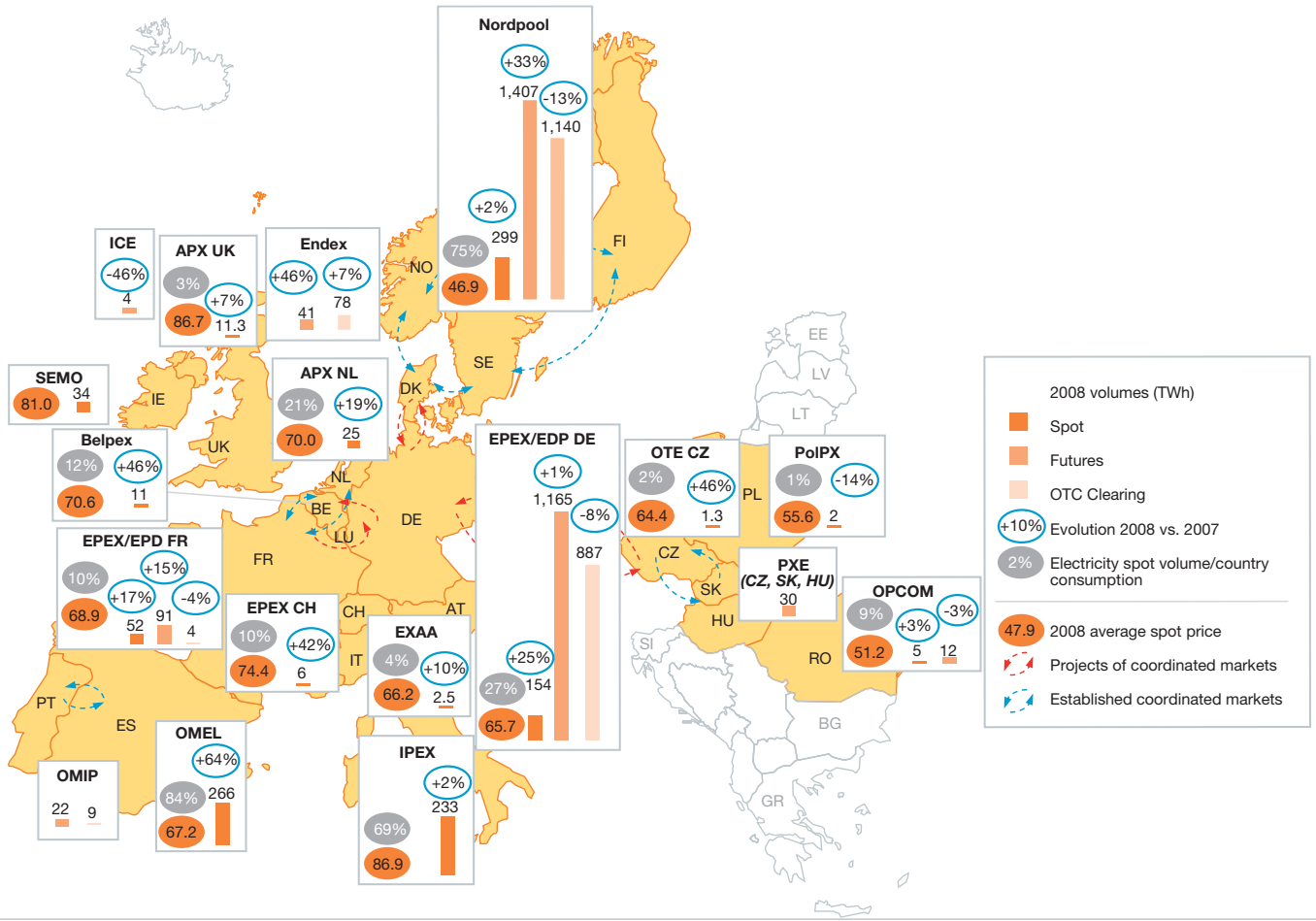
Well supplied systems with reduced peak load and/or increasing capacities illustrated by the recent spike-less period, lead to convergent forward markets.

Table 2.4 Electricity futures prices (year ahead) on the main European markets (2008 and H1 2009)



Source: Platts PowerVision – Capgemini analysis, EEMO11

Table 2.5 Map of electricity trading (2008)



Source: Power Exchanges web sites – Capgemini analysis, EEMO11

During 2008, power, in particular the liquid German products, was revealed to be an investment instrument that was used by financial institutions. Traded volume for German base load calendar products stayed reasonably stable, with around 1 GW traded per day. Thus, power had been seen as a "commodity like" investment in €, and not in $ as with oil or coal. Such consideration explained, from time to time, the de-correlation between power and commodities[14]. For instance, commodities were in contango during H2 2008, whereas power was in backwardation. In H1 2009, with the lack of direction given by fuels markets it has been said that speculative trading might have shaped power prices in relation to the stock exchange.

Volumes on spot power exchanges kept growing, whereas traded volumes on term markets suffered temporarily from the global financial crisis and from some initiatives in the field of regulation and long-term commercial activities

Organized spot power exchanges operate in 19 countries (see Table 2.5), offering day-ahead products (delivery the next day) with some offering intra-day products (delivery within the next hours). The volumes on day-ahead market increased in 2008 compared to 2007, the most significant increase being the one on the German power exchange (+25%, at 154 TWh, representing a quarter of the German annual consumption). The Nordpool platform continued to dwarf European markets in volume, representing three quarters of the Scandinavian consumption. Czech and Hungarian wholesale markets saw their volume

[14] Oil price has also different drivers. Fundamentals driver such as supply-demand balance and production costs are from time to time challenged by more macro-economic drivers such as world growth or US$ strength/weakness.

increase to a comparable volume of other West European markets such as the Netherlands or Spain with around 500 MW traded per day for short-term products.

Some power exchanges also offer forward or future contracts, for power delivery within a future period (a month, a quarter or a year). The main trend was the increase of volume on products directly traded on exchanges and the decrease of clearing services for Over-The-Counter (OTC) transactions. It reflected the temporarily movements of market participants to the safer harbor of exchanges that offer lower counterparties' risks during the global financial crisis.

The Lehman Brothers bankruptcy in October 2008 had little impact on traded volume and on clearing services demonstrating that these markets are more resilient than at the time of the Enron collapse.

The set-up of special tariffs in France (Tartam) hindered liquidity in 2008 with a downturn of traded volumes. The uncertainty around the continuation of such mechanism or new ones (Champsaur Commission) as well as the outcome of long-term contracts (e.g. Exeltium in France or EDF auction to end-user suppliers) created uncertainty that market players do not appreciate.

Under scrutiny of regulators, exchanges and TSOs kept innovating to promote transparency and to take into account decentralized production (especially wind)

ERGEG stated in September 2008 that the European power markets were not compliant to European rules with respect to cross-border trades and congestion management.

Exchanges

In 2008, exchanges continued to compete to offer new products. Nordpool set a spot trading platform for Germany; APX and ICE struggled to develop exchange-based trading operations in the UK, a market traditionally dominated by OTC transactions. In Italy, the existing spot exchange developed forward contracts for the front end, whereas a new operator, IDEX, offered back-end products. PXE, known as Prague Power Exchange, was renamed Power Exchange Central Europe, and offered products for the Czech Republic, Slovakia and Hungary.

Some movements of exchanges consolidation were observed. French Powernext and German EEX merged and started their operation on July 1, 2009 under the name of EPEX. In the Netherlands, the spot operator APX bought the futures exchange Endex.

TSOs

TSOs took many initiatives to encourage the development of the markets, especially cross-border and intra-day:

- Norway joined the intra-day Elbas market (Finland, Denmark (partly), Sweden and Germany);
- German, Czech, Austrian, Slovak, Polish, Hungarian and Slovenian TSOs launched a Central Allocation Office that aims at developing congestion management solutions in Central Eastern Europe;
- Dutch and Belgian TSOs offer from May 2009, intra-day cross-border capacities;
- Western countries TSOs initiated a consultation in Q2 2009 on how to organize a secondary market for cross-border rights.

Some initiatives were not always successful. The market coupling between Germany and Denmark suffered technical issues and closed after a few weeks of operations in October 2008.

Decentralized production

The development of decentralized production led to some adjustments to the market design of wholesale markets. TSOs, as well as exchanges, were largely involved for network stability reasons[15] and to favor cross-border trade so that countries with highly flexible power plants such as Switzerland could benefit from wind-dependant systems such as the German one.

[15] On November 2, 2008, some wind plants were de-coupled from the Spanish grid because wind was endangering network stability due to its high share of load (30%).

In April 2008, the German power exchange EEX introduced negative prices for day-ahead auctions. It allows a new price discovery mechanism showing the price that generators are willing to pay in order not to reduce power output of their less flexible plants, such as lignite or nuclear plants. Consistently with this change, the German law on renewable energies was adopted. In the future, wind production will be sold directly on the day-ahead and intra-day markets, whereas up to now, the TSOs were buying it and transforming it into a base load product for suppliers. This change will probably increase the frequency of negative pricing.

Belpex started in June 2008 to sell intra-day products in order to adapt to the development of wind production.

Continuous pressure to increase transparency led to more information being available for market participants

The power price movements in 2008 drew political attention, and actions were initiated to (help) understand markets. Some improvements in data transparency were noticeable in 2008 and H1 2009:

- From July 2009, some additional information on French generation units' availability was published on the TSO's website;
- TenneT, the Dutch TSO, launched a new website with data on the power system (production, load, cross-border, etc);
- ENTSO-E, the association of European TSOs, released an improved version of its ETSOVISTA website in September 2008, with information about load, cross-border capacity, and outage information.

The French regulator published in January 2009 its first report on the power wholesale market for the year of 2007. The results showed the absence of price manipulation, the necessity to refine some methodology to analyze the markets, and the critical need for transparency.

The crisis impacted forward markets, although quantification on prices is hazardous. Traders focused more on the reduction of demand than on the reduction of investments in generation

The economic crisis impacted the demand, both for peak load and total energy consumption. In the autumn of 2008, the UK's National Grid already forecasted a decrease of 500 MW on the peak load for the winter 2008/2009 as an impact of the crisis. Statistics for H1 2009 showed a decrease of power consumption in Europe. The French peak load in May 2009 decreased 3% year-on-year (-1.7 GW), easing fears over price spikes due to a shortage in supply for the summer.

The crisis impacted also the supply side, as some power generation projects were delayed.

Only the demand side is reputed to be considered by traders. On the supply side, uncertainty over projects is either out of time horizon of the markets or within the usual range. Reduction of demand has consequences on the peak load, thus reducing spreads between countries and on the total energy consumption leading to lower prices. Quantification on price is nevertheless difficult.

Key issues in the United Kingdom

The UK is facing an imminent need for new power stations with around 20 GW of plants to close by 2015 (about 25% of the current installed generation capacity). Policy makers are concerned to ensure that the new generation plants get built by the private sector, and that they are consistent with the objectives of reducing Greenhouse Gas (GHG) emissions.

Developments of note are:

- **Nuclear:** the UK government is exploring the detail of how to make private company operations of nuclear plant work with a specific focus on ensuring the companies cannot avoid decommissioning costs at the end of a station's life;
- **Carbon Capture and Storage (CCS):** the UK has launched a competition to select a new power station to be subsidized as a demonstrator of CCS.

The UK policy is becoming more favorable to smart metering but it is still evolving. A mandatory rollout of 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 is now subject to a major investigation by the Competition Commission, which could have significant implications for the future UK energy policy. The UK wants the private sector to build new power stations meaning that the price paid by customers must be sufficient to cover the costs of building and operating these stations.

After the acquisition of British Energy by EDF in September 2008 to gain access to its generation sites for future nuclear power stations, then the divestment of 20% of BE shares to Centrica, rumors are circulating about the divestment of 20% more shares.

Electricity Retail Markets

In 2008, the retail electricity business was strongly impacted by the effect of the economic crisis, which clearly divided the year into two parts.

The economic slowdown had a strong impact on electricity consumption, which started to fall in Q4 2008; but not on the retail electricity prices, which led customers to raise claims against retailers' high prices.

As retailers' business models are still very heterogeneous in European countries, answers to these customers' demands can vary a lot, but generally have not been favorable to the development of competition.

Following the economic slowdown, electricity demand reduced from Q4 2008 onwards

2008 saw a growth in European electricity consumption compared to 2007 in almost every country. This hides more complex and different realities (see Table 3.1):

- In the countries where overall consumption has increased, growth was observed in the first quarters of the year. For example, in France, increases of 5%, 7% and 2% were recorded for Q1 to Q3 2008, compared to Q1 to Q3 2007. Spain showed 2%, 3% and 2% increases for the same periods;
- In some countries like the UK, Italy, Sweden, Belgium and Finland, overall consumption decreased in 2008 with the growth from the early part of the year being more than offset by the significant decrease in the later part of the year.

Across Europe, the first effects of the financial and economic crisis showed in the Q4 2008 consumption levels. As soon as economic activity started to slow down, electricity consumption reduced. This reduction was even more important in Q1 and Q2 2009.

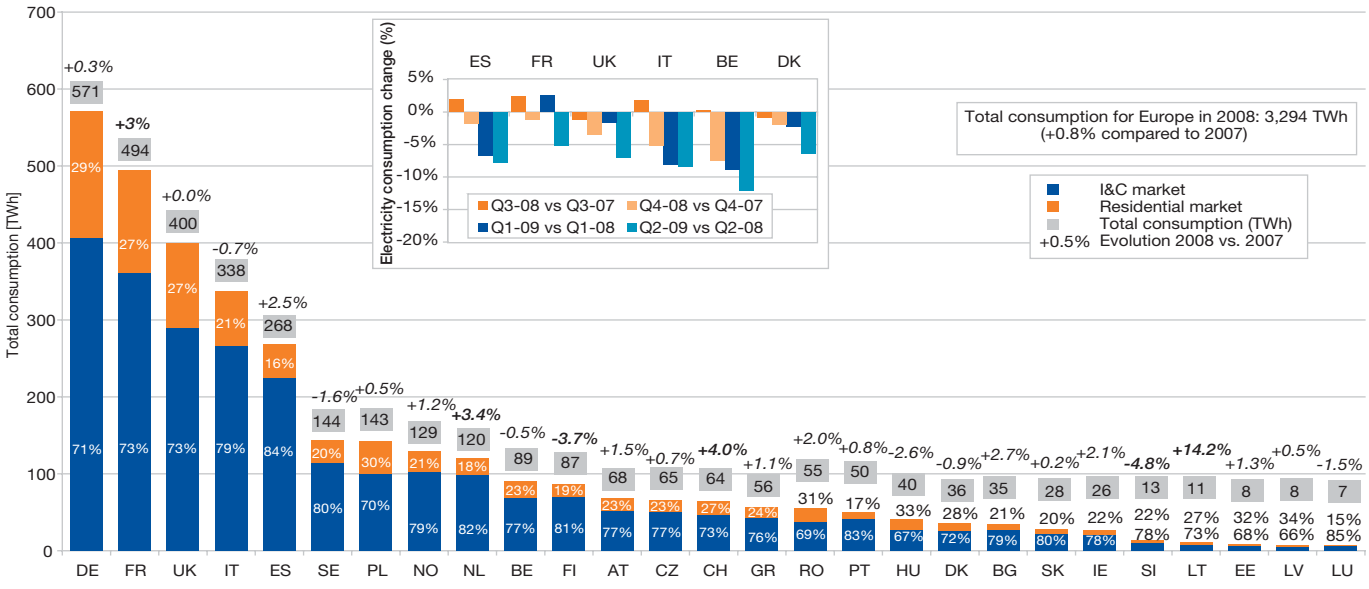
The response to the economic slowdown varied with customer type:

- Industrial consumption follows closely the economic cycle with very large industrials being particularly affected showing more than 15% reduction especially in the petrochemical and steel sectors;
- Residential and commercial consumption is less impacted and continued to grow albeit at a lower level.

Retail electricity prices continued to increase in 2008, even in the second half of the year, which generated tensions between consumers and retailers

Despite progress in market integration, significant differences in the electricity retail prices were observed in different countries. A study issued by VaasaETT[16] shows that prices could vary by 300% from one capital city to another, demonstrating that we are

Table 3.1 Total electricity consumption and size of I&C and residential markets (2008)



Source: ENTSO-E, BERR, EirGrid, SG Smart Energy Index – Capgemini analysis, EEMO11

[16] Household Electricity Price Index for Europe, May 2009 – a monthly index looking at households prices in the capitals of the EU's 15 pre-2004 member countries (E-Control and VaasaETT)

still far away from being a single European electricity market.

The rise of electricity prices exhibited the same tendencies almost everywhere in Europe (see Tables 3.2) with the highest increase for Medium to Large industries (+21% in average) and a lower increase for Small to Medium and Very Small industries (respectively +12% and +11% on average). The 2007 trend continued during the early part of the year. The rise of worldwide energy demand has led to a rise of wholesale energy prices, which has led, almost everywhere, to a dramatic rise of retail electricity prices.

In some cases, like Germany and Denmark, this wholesale prices increase has been also combined with a grid price increase. In Germany, grid tariffs have increase from 7 to 30% between 2008 and 2009, depending on the network. The German regulator Bundesnetzagentur said that the main reason for this increase was the cost of system services relating to wind energy.

This rise reached its peak in the summer of 2008, higher in purely competitive markets, more moderate in countries with regulated tariffs. In the UK, EDF Energy raised its prices by +22%, E.ON by +16% and Scottish Power by +9%.

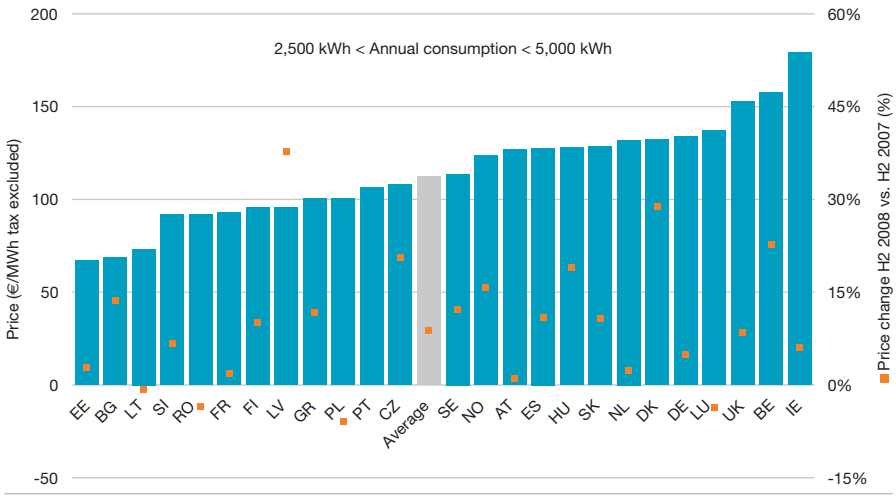
In the households segment (see Table 3.3), the average price rise was less important (+9%) due to the persistence of regulated tariffs in many EU member states. However, increases still occurred: in France in the summer of 2008, the government agreed a 2% rise in tariffs while in Italy the tariffs increased by +0.8%.

Globally, 2008 has led to a significant increase of electricity prices for all market segments. This is most extreme for the Nordic, Baltic and some Eastern European countries. In Latvia, for example, according to the regulator, electricity prices are rather low compared to other countries, which hampers competition and prevent competitors from entering the market.

Table 3.2 I&C electricity prices (H2 2008 and % change with H2 2007)

Source: Eurostat, regulators, companies annual reports – Capgemini analysis, EEMO11

Table 3.3 Residential electricity prices (H2 2008 and % change with H2 2007)



Source: Eurostat, regulators, companies annual reports – Capgemini analysis, EEMO11

Everywhere, retailers justified these prices increases by the costs of fuels and hence wholesale electricity.

However, during the second half of 2008, when primary energy prices fell, the retail electricity prices did not follow.

This asymmetric response raised objections from consumers especially as recession made it difficult for them to bear increased energy costs.

This led to consumer pressure for electricity prices decrease in many countries, coming both from households and industrials. Some governments and regulators sought lower prices from retailers:

- In Austria: in response to public pressure, the government extended its monitoring program to cover gas and electricity tariffs;
- In Germany: VIK (large consumers' organization) reported a growing protest from large industrials over electricity price rises which included both power price and network charges increase;
- In the UK: many actions are undertaken by Ofgem against the "Big 6" retailers. The regulator urged them to explain cost changes to consumers ahead of winter 2009/2010 and what impact the decreasing wholesale prices could be foreseeable on end-users prices. It also suspects the "Big 6" of having questionable commercial behaviors towards I&C customers to prevent themselves against unpaid bills and threatened them to launch an enquiry on the subject.

As a result of these tensions in the UK, Ireland, and Belgium, some of the electricity retailers took measures to lower their prices. In the UK, during early 2009, electricity tariffs for end business customers rose to a much lesser extent than spot prices on the wholesale market.

But in most countries, prices did not decrease and are not likely to do so, as 2009 saw a rebound of oil prices. Therefore, (as in the UK, France and Spain), retailers are still asking for raises, generating discussions and sometimes regulatory inquiries to determine if these prices are justified by costs or generate some undue profits. These debates demonstrate that electricity markets are still far from being perfectly competitive markets driven by demand-offer balance.

Competition and churn progressed everywhere in Europe, but the economic crisis has emphasized the need for taking into account some customer segment specificities

Competition has progressed in 2008 and at the beginning of 2009, both in terms of switching behavior and in terms of market structure.

Many countries in 2008 have seen the switching rate go beyond 5% (UK, Belgium, the Netherlands, Sweden, Germany and Finland). In France, the possibility to come back to regulated tariffs has allowed a real increase in households switching rate.

In most of the countries, some structural measures are also on the way to be undertaken in order to push the market towards more competition. In France the "Champsaur Commission" recommended the removal of tariffs for industrial customers and to allow all the electricity retailers to have access to the nuclear base load production at a regulated price reflecting nuclear power plant costs (see Box on France). In Sweden, a consortium of the main electricity retailers launched the EMIX platform which allows a much easier switching process.

However, despite these progresses, a study published by ERGEG in April 2009 showed that competition in retail electricity market in Europe was still low:

- Eighty percent of final electricity and gas consumers in Europe still benefit from regulated tariffs;
- Fifteen countries (out of 26) still have regulated tariffs for electricity (see Table 3.4);
- Among these 15 countries, only six have committed to an extinction schedule and in 12 of these countries, regulators have no power to drive this extinction.

Table 3.4 Status of electricity price regimes (as of July 2009)

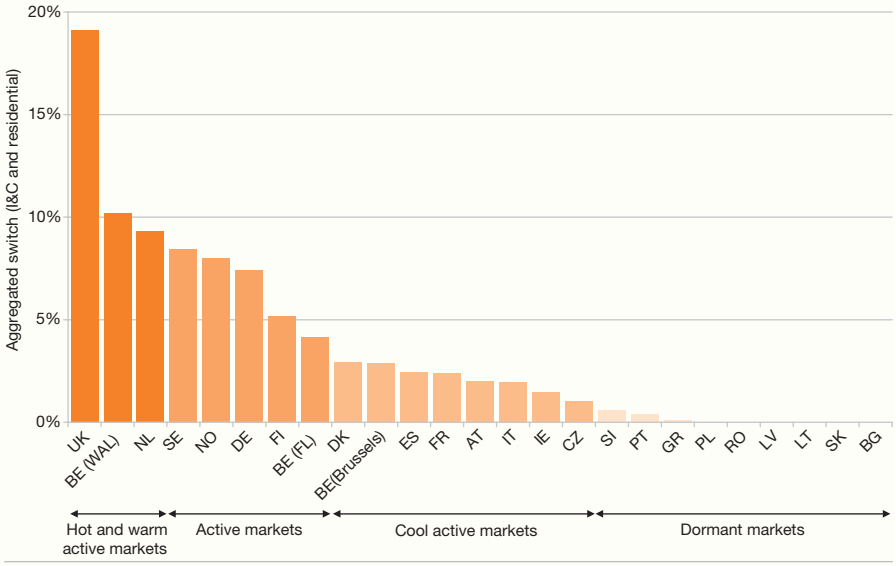
Country	Existence of regulated tariffs (date of price control removal when available)
AT	N *(2001)*
BE	N *(2007)*
BG	Y
CZ	N *(2006)*
DE	N *(2007)*
DK	Y
EE	Y
ES	N *(July 1 2009)*
FI	N
FR	Y
GR	Y
HU	Y
IE	Y
IT	Y
LT	Y
LU	N *(2007)*
LV	Y
NL	Y
NO	N
PL	Y
PT	Y
RO	Y
SE	N
SI	N
SK	Y
UK	N

Source: CEER, Platts – Capgemini analysis, EEMO11

Customer switching still increasing but a two-tier Europe emerges

Switching activity in Europe saw significant transition in 2009 with convergence occurring as the most active markets largely sustained, and some less active markets increased their activity. The overall picture, however, is an increasingly two-tier Europe, split between those with active competition and those with competition present only in the medium to large I&C market. Of the 26 European markets followed by the VaasaETT Utility Customer Switching Research project, seven significantly increased their switching rates. The European average switching level for 2008 was consequently only slightly changed at 3.5%.

Annual European electricity switching rates (2008)



Source: VaasaETT – Capgemini analysis, EEMO11

Hot and Active Markets

The UK remains Europe's most active market in terms of customer switching, maintaining its nearly 20% level of switching in 2008, but Wallonia (Belgium)[a], the Netherlands and Germany were the stars of 2008 rising to over 10%, 9% and nearly 8% respectively. Switching was fueled, for instance, by high or rising prices and some aggressive new entrant marketing. These markets became Europe's second, third and sixth most active markets respectively. Finland also increased to over 5% following substantial negative publicity resulting from price rises and other corporate issues, and France finally became active despite a relative absence of price incentives.

Upon further analysis, there is a significant underlying propensity to switch among the more active European markets. When appropriate switching conditions prevail, switching levels tend to increase suddenly and dramatically, falling back somewhat when conditions are less appropriate, but never becoming inactive. This propensity to switch is increasing over time, gaining momentum from each successive period of volatility.

Fallers

Swedish and Norwegian switching levels fell slightly but remained the fourth and fifth most active markets in Europe respectively, indicating a temporary cyclical easing but no more. Other fallers included Flanders (Belgium), Denmark and Ireland, but these too had only small changes and were not an indication of any trend change.

Dormant Markets

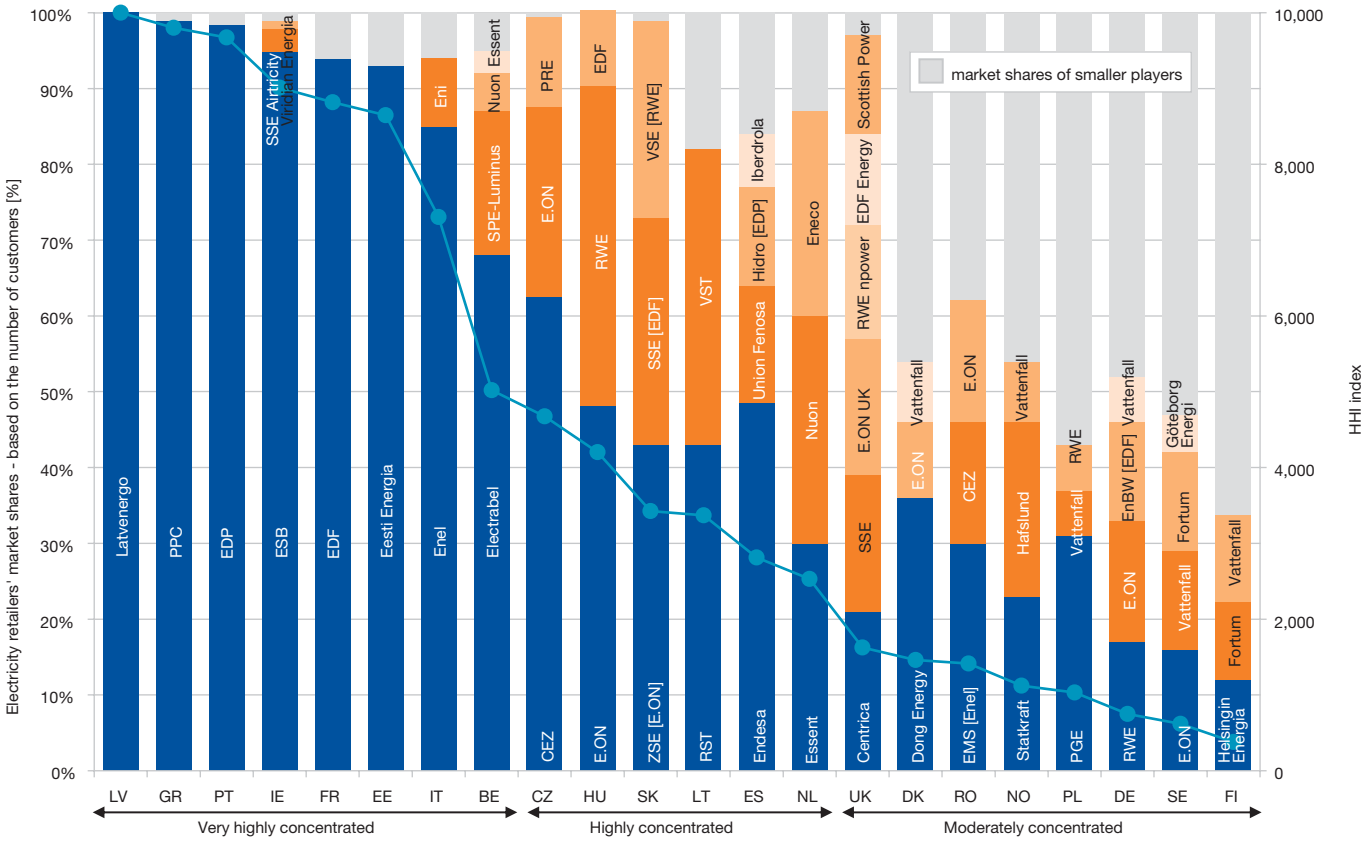
Despite the overall increase in activity, 10 of the 26 markets surveyed have switching levels below 1% and in several cases have less than 0.1% switching. These markets have no apparent switching propensity, largely because competitive conditions remain inappropriate due to, for instance, excessive market concentration, a lack of new entrants, poor customer awareness, and low price caps. Most of these markets are expected to remain inactive for some time to come.

Recession – a major impact

There is no doubt that the economic downturn has provided fresh impetus to switching activity in Europe, however the predominant impact has emerged only in 2009 when switching levels in some countries have rocketed. During the first half of 2009 alone the European switching rate average has increased to around 5%. During the same period, Ireland has experienced an annualized rate of nearly 20%; Denmark, Sweden and the Netherlands rate of around 11-12%; Finland 7%; and even France has seen its highest ever rate of over 3%. Market analysis has revealed that the recession has generally increased customer sensitivity to price levels.

a) The switching level in 2007 was higher than 2008 but was only based on months of complete data

Table 3.5 Electricity retail market concentration (2008)



Source: Companies' web sites and annual reports, National Regulators– Capgemini estimation, EEMO11

Even in the most competitive countries, competition is still far from being perfect. Table 3.5 has to be considered very carefully, especially when it comes to comparison with the previous year, because energy retailers disclosed very little figures on market shares. Nevertheless, it appears that the overall situation did not change a lot and that, in most of the cases, oligopoly replaced the old monopolies. This situation is a growing concern among regulators:

- In UK, an Ofgem report shows that among the "Big 6", the high switching rates reflect a not so competitive reality: people mostly switch from their incumbent electricity retailer to British Gas or vice versa. Therefore the market remains highly concentrated;
- In Spain, the CNE analyzing the electricity price increases, has pointed out that the market concentration between three electricity retailers could have significant impact on prices formation.

In this context, some particularly sensible customer segments asked for specific treatment or appeared to require special protection measures:

- For competitive reasons, industrials want to protect themselves from electricity volatility prices and try to negotiate long-term contracts and would like to see this need reflected in the market design:
  - In France, electro-intensive customers, grouped in the Exeltium consortium negotiated base load furniture directly with EDF at a special tariff for 24 years. After difficult negotiations, the EC finally gave its green light on July 2008 and the participants hope to launch the consortium at the beginning of 2010, having finally managed to secure financing of an initial €1.5 billion loan in September 2009;
  - More generally, industrials tried to put pressure on the French government to allow them to have access to electricity base load at the same conditions as retailers if the "Champsaur Commission" recommendations should be applied.
- The economic crisis also showed the necessity to consider the needs of low income people, especially in countries where regulated tariffs no longer exist. Governments tried to take this into account, but this could lead to complex compromise as in Spain where the government has decided to assume the financial cost of the difference between market prices and regulated tariffs. But in exchange, the retailers have to promise to cap the tariff for vulnerable households until 2012.

The economic crisis generated tensions between retailers, consumers and governments and challenged the liberalization process. While not obstructing it totally, it eventually slowed it down.

The retailers' business model is still difficult to find and the economic crisis has made things even more difficult for retailers who experiment different strategies to protect their margins

A study made by Capgemini[17] shows that Cost to Serve per customer is very high in the retail business compared to the possible sales prices, often "de facto" capped by the regulated tariffs (see Box Cost to Serve). Therefore, electricity retailers often register very low net margins on the households segment. In the context of the economic crisis, governments have difficulties in allowing a raise of regulated tariffs to retailers and this equation does not seem to be solved. This leads retailers to develop various strategies to enhance their business model, especially on the households segment. These strategies mix customer relationship management, new offer development, sales channel innovation and operational excellence programs.

In the markets where competition is the most active, the operators have developed sophisticated customer segmentation and an Ofgem report issued in October 2008 pointed out the development of those strategies and their potential dangers:

- High value customers are identified and strong incentives are proposed to those who can spare some costs or generate more revenues;
- The dual offer, very developed in some countries like the UK is often a good way to increase the revenue per customer without increasing the costs in the same proportion;
- Companies try to push low value customers towards Internet self service facilities which is convenient for the customers and lowers the Cost to Serve;
- Direct debit is also a very common way to lower the payment transaction cost and some retailers offer financial incentive to their customers to choose it.

Though this way of customer management tends to generalize through all countries, some side effects appeared underlined by the crisis.

Ofgem described the problems encountered in the UK by the customer categories which cannot benefit from this segmentation. For example, rural customers not connected to the gas grid cannot benefit from dual offer and bear full price for stand alone electricity or old people who do not use direct debit or Internet also pay full price.

In all countries, retailers develop new offers in order to try to maximize customer value and to differentiate themselves on the market:

- New offers are still often tariffs offers trying to attract customer by the most sensitive switch driver, which remains the price. For example, Iberdrola proposes almost a 12% rebate to small and medium industrials and offers an additional 3% rebate in case of assistance services subscription;
- Green offer is also perceived as a good way both to differentiate and to enhance customer value. Even in this crisis context, customers still seem to be sensitive to ecology. In Belgium, Electrabel launched a 100% green offer guarantee coming from green Belgium production. In June 2009, Electrabel reported that 220,000 households and 30,000 very small and medium industrials have chosen this offer called VertPlus;
- Some pioneering offers have also been developed, for example by Poweo in France which announced in December 2008, the launch of "Grand Froid", an offer proposing to its customers an insurance to offset additional expenses in case of exceptional cold weather.

Electricity retailers with important growing strategy are looking for sales channel strategy able to reduce their acquisition costs. In France, Poweo has signed off some agreements with some major retailers. In January 2009, Carrefour started proposing in its supermarkets some Poweo electricity under the brand "Carrefour Energy" and since May 2009, people can buy Poweo offers in Darty retail outlets.

Whatever the country and the strategy, cost control is becoming a necessity for retailers and most of the companies put in place operational excellence programs in order to enhance their net margins.

Sustainable tariffs: a good marketing tool to support energy conservation

After decades where energy has been considered as a commodity with a one and only rule: the more you consume, the less you pay, people are starting to be conscious that energy is a scarce resource. In this context but also because of growing competition, **Utilities are looking for new types of tariffs** with the objective of:

- Supporting customers' mindset change;
- Helping customers to consume less during peak hours and incentivizing them to shift their consumption;
- Participating in energy savings/efficiency and CO_2 emissions reduction targets;
- Proposing value-added and innovative offerings.

Several solutions are being used around the world to incentivize sustainable consumptions behaviors.

Without smart metering, multi-tiered tariffs (US, Canada) allow billing cheaper kWhs to the consumers when their monthly consumption stays below a pre-set allowance (baseline). Price per kWh then increases progressively when consumption exceeds the baseline. Cheaper tariffs can also be granted to consumers who can choose efficient heating/cooling solutions (Germany, Switzerland). With classic multi-index meters, Time of Use tariffs have been proposed in France since the 1970s.

With smart metering and/or control devices like energy boxes or smart thermostats, it is possible to apply critical peak pricing, real time pricing, and also to reward the customer for interruption/shift of air conditioning, heating, and boiling water use. **Well designed offers including direct load control to improve the comfort and ease-of-use experienced by customers.** They also multiply the savings by a factor two to three compared to tariff based only incentives (peaks shaving and energy savings), **therefore enhancing the financial win-win and the trust between customers and Utilities.**

[17] European multi-client retail benchmark, a study on Cost to Serve (CtS) and Cost to Acquire (CtA) focusing on the households, September 2009

Competitive Gas

Upstream

After three consecutive years of decline, gas production of the EU-27 members returned to growth in 2008 by 1.5% to 190.3 bcm (compared with 187.5 in 2007), but it is slowing down in 2009 due to the economic crisis

The main factor explaining this pattern is the increase of European gas consumption compared to 2007, partly due to a cold normal winter as opposed to the unusually mild winter that occurred in 2007.

As shown in Table 4.1, most of the EU-27 members fully depend on imports to fulfil their consumption needs. Denmark, the Netherlands, Romania and the UK on the opposite side rely on their production to fulfil most if not all of their needs.

This growth of indigenous production was explained mainly by an increase of 11.5% of gas production in the Netherlands which accounted for over 35% of EU-27 gas production. This was mainly due to enhanced production from the Groningen field (the largest European gas field), and a surge in marketed production from Denmark which rose by 9.4%. In the meantime, production decline in the UK (which accounted for over 36% of EU-27 gas production) was only 3.4% which is below the average yearly rate of 8.5% in the previous four years.

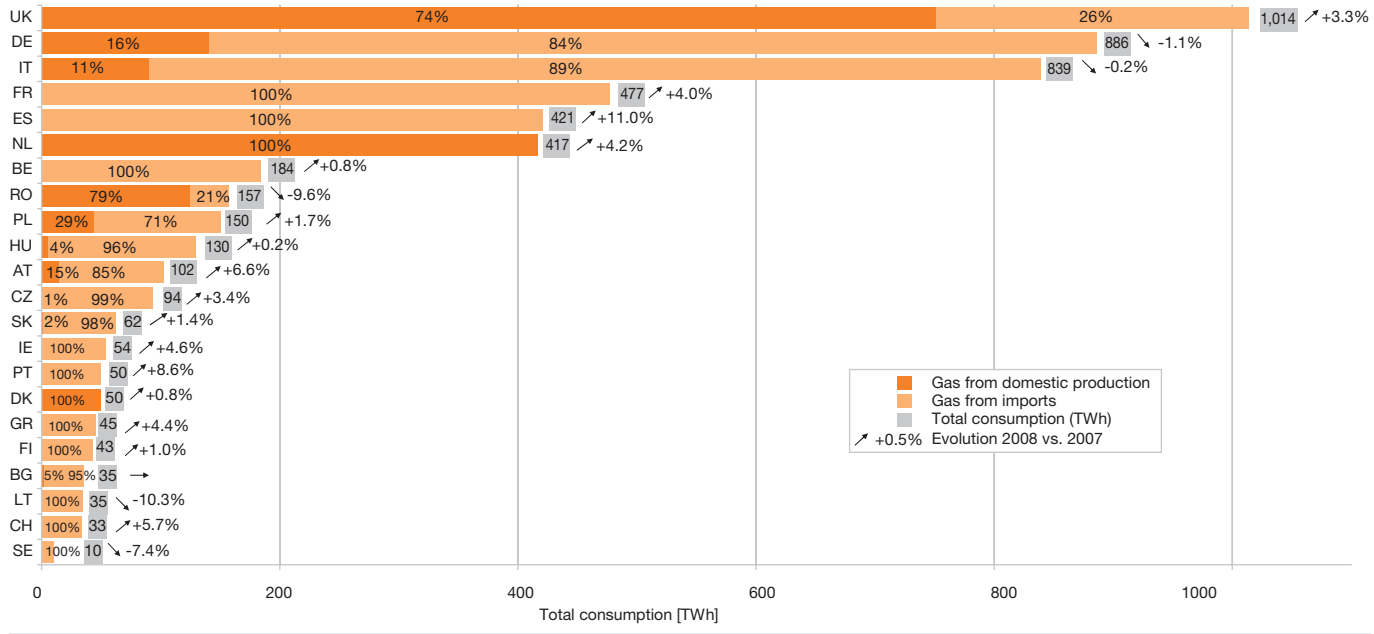
In other European gas producing countries, decline in production continued such as in Germany (-8.9%) and in Italy (-5.9%), while it remained stable in Romania. Together these six countries accounted for 95% of EU-27 gas production.

In all the EU-27 countries however, the last quarter of 2008 saw significant slowdown of gas consumption because of the impact of the economic crisis on the industrial sector consumption. The economic crisis that overtook the world at the end of 2008 is expected to depress demand throughout 2009 and into 2010, and thus impact production. According to Cedigaz, gas production is expected to drop in the North Sea in 2009, with a double-digit decline likely in the UK due to natural depletion, declining domestic consumption, and record low prices particularly impacting dry gas production.

European gas companies increased their production in 2008 but in 2009 and subsequent years, a reduced demand and an increased pressure on price are expected

Most of the top 15 European gas producing players, which represents over 90% of European production (EU-27+Norway) increased their gas production in Europe in 2008 (see Table 4.2). This 3.5% growth can be largely attributed to StatoilHydro and Royal Dutch Shell with a 10% increase of their gas production in Europe. The ramp up of production from Ormen Lange and Snøhvit and the start of production of seven new fields explained StatoilHydro's performance. The 8% decrease of Total's European gas production is mainly due to technical incidents on UK fields, while Eni's 6% decrease is largely attributable to production reduction in Italy and in the UK due to mature field declines, as well as facility downtime in the North Sea.

Table 4.1 Domestic gas production versus imports (2008)



Source: BP statistical review of world energy 2009, Eurogas – Capgemini analysis, EEMO11

C. Lewiner (ed.), *European Energy Markets Observatory*, DOI 10.1007/978-94-007-0101-4_3,
© Springer Science+Business Media B.V. 2010

With the economic downturn, some observers of the market expected that European gas demand may fall under the minimum bill supply requirements from all contracts. Europe would then be oversupplied since previously gas buyers were seeking more supply to meet actual and forecasted growth in demand which will not happen in 2009, and probably not in 2010.

Several gas buyers used the flexibility offered by Russian take-or-pay contracts to defer during the winter 2009/2010 their imports from H1 to H2 2009 or to 2010. Gazprom stated that its deliveries to Europe dropped by 45% in H1 2009. It expects an increase in gas withdrawal in H2 2009 due to obligations by take-or-pay contracts to buy a minimum bill for the full year. Gazprom expects its exports to Europe to reduce by around 8% in 2009 compared to 2008.

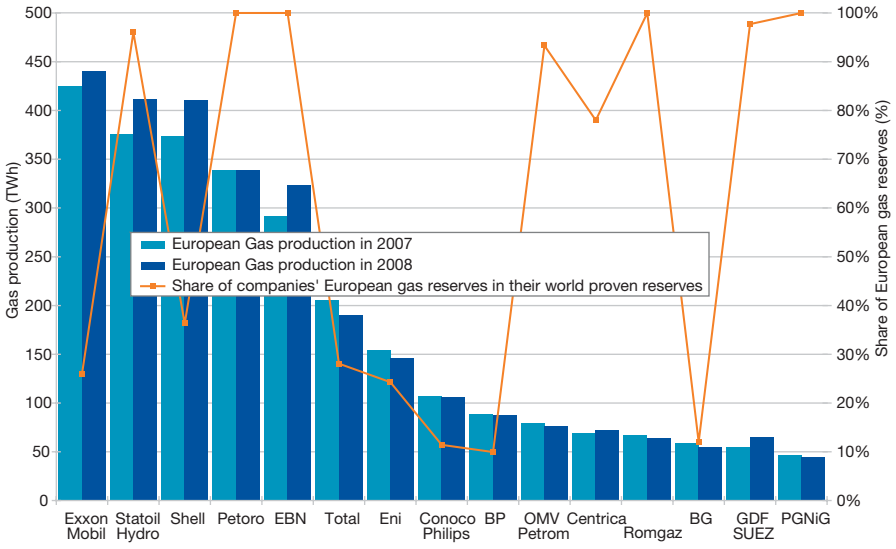
The decline in demand may also result in reduced production from indigenous fields and in revenue loss for gas producers. When prices were low at the beginning of 2009, North Sea producers in particular may have held production so as to wait for price increases or advance maintenance schedules on fields. A longer and deeper recession and its consequences on gas demand could lead gas producing companies to review their strategy and portfolio of assets and investments.

In 2008, reserves level globally continued to decrease at a fast pace. At the end of 2008 and in 2009, credit crunch and lower oil prices caused a reduction in capital spending that may possibly impact reserves renewal rate if it is sustained beyond 2010

The proved gas reserves of EU-27 were 2.87 tcm at the end of 2008, compared to 2.91 tcm at the end of 2007 (see Table 4.3). The reserve-to-production ratio (R/P) was at 15.1 years of reserves at the end of 2008, while it was 15.5 at the end of 2007.

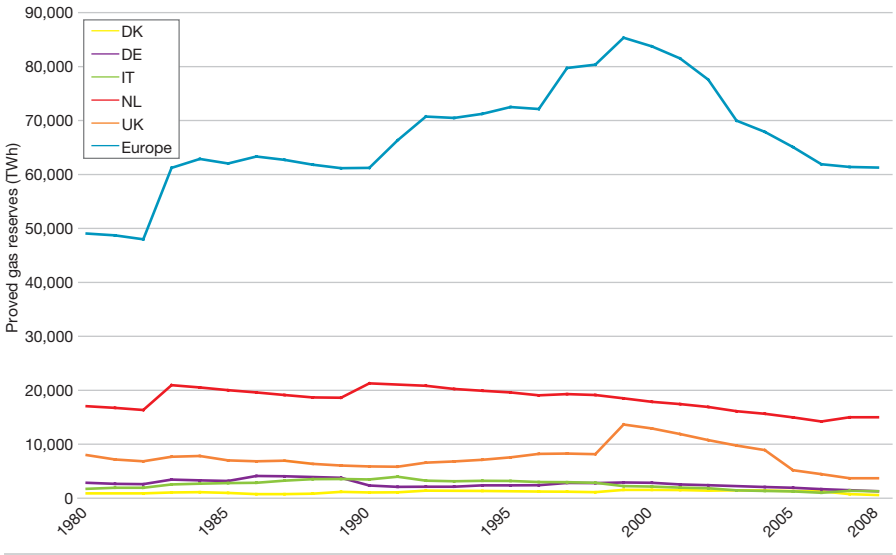
In 2008, Germany continued to face a dramatic reduction of its reserves with a 13.1% drop. Since 2003, gas reserves in Germany decreased by 10% per year.

Table 4.2 Gas production and share of European proved reserves by company (2008)



Source: Companies' annual reports – Capgemini analysis, EEMO11

Table 4.3 Proved gas reserves (2008)



Source: BP statistical review of world energy 2009 – Capgemini analysis, EEMO11

Denmark's gas reserves also continued to diminish in 2008 (-20.3%), although the outlook for activity in the North Sea has some bright spots. The Danish Energy Agency (DEA) considers the Svane gas discovery made by DONG Energy to potentially be the largest gas field ever

discovered in Denmark. Italy also faced a decrease of its gas reserves (-7.1%).

The UK and the Netherlands, Europe's largest gas reserve holders, managed to maintain the same level of reserves as in 2007, partly thanks to the measures that their governments and energy agencies took to increase the renewal rate of their reserves (increase of the number of exploration licences in the UK bid rounds) and to extend the lifetime of their biggest fields (cap production of large fields such as Groningen). Other European gas producing countries like Romania or Poland also maintained the same level of reserves.

Reduction in gas consumption in Q4 2008 was also a key element to explain the production output decrease, and thus preserve the gas reserves of the EU-27.

Another key point to be noted is that the current economic crisis, in conjunction with lower oil prices, is affecting capital investment. Between Q4 2008 and Q2 2009, many companies have made announcements of cutbacks in oil and gas investments, and project delays and cancellations. Furthermore, tight credit markets have limited the ability of smaller companies to raise capital. According to the International Energy Agency (IEA), upstream oil and gas investment budgets for 2009 have already been cut by around 21% compared to 2008 at a global level. Exploration investments are expected to drop significantly in the North Sea but also in continental Europe, putting a pressure on reserves renewal. In addition, budget cuts on existing fields risk pushing up decline rates, which are already very high in some European gas producing countries.

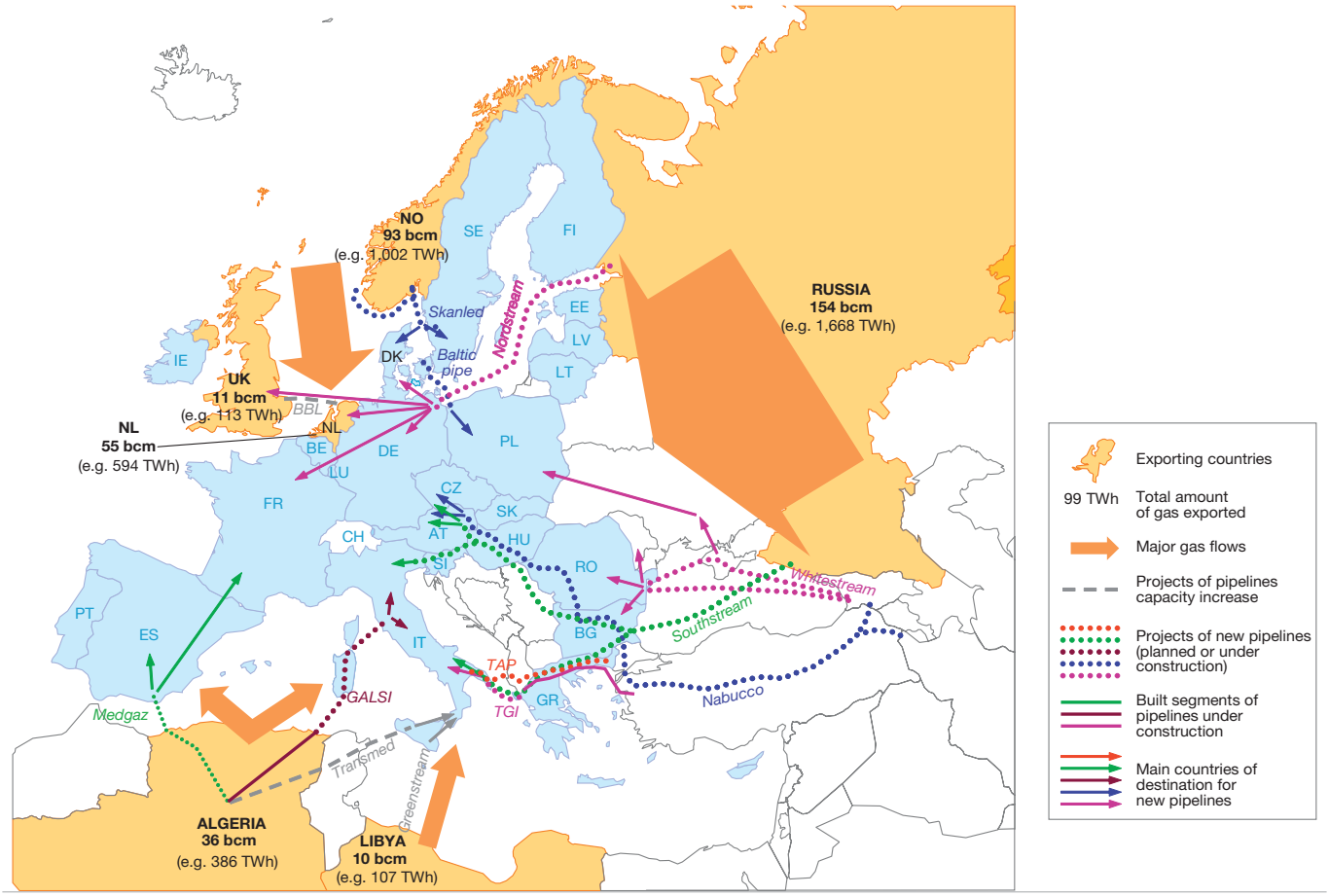
For instance, North Sea fields which are very mature are relying heavily on continued capital investment to sustain production. If reductions in capital spending are maintained after 2010, it is likely to have adverse consequences which will prove difficult to reverse on these old fields. Development drilling on fields as mature as those of the North Sea is less about pushing forward a peak in production, but rather more about slowing or simply maintaining the current decline rate.

The import dependency towards extra European sources, mainly Russia, remained unchanged and little evidence of improvements can be shown in terms of security of supply

Indigenous gas production of the EU-27 countries covered 38.8% of total net supplies in 2008, remaining quasi stable compared with the 39.0% in 2007.

LNG trade movements rose by 5.8% in 2008. This increase resulted mainly from an 18.8% growth of Spanish LNG imports which represents over 57% of European LNG imports. Greece and Portugal also increased their imports of LNG by respectively 16% and 12%. High price of oil and coal made natural gas competitive up until Q4 2008. Other countries such as Belgium, France and Italy lowered sensitively their LNG imports, relying more on pipeline deliveries.

Table 4.4 Map of gas imports through pipelines and pipelines projects (2008)



Source: Eurogas, Companies' web sites, GIE gte – Capgemini analysis, EEMO11

Gas traded by pipeline increased by 4.7%, from 260 bcm in 2007 to 275 bcm in 2008. In particular, Norwegian and Dutch pipeline exports increased by 8% and 9% respectively. The trade movements by pipeline from the Netherlands is largely attributable to increased deliveries to the UK (+10%) through the Balgzand-Bacton Line (BBL) pipeline, as well as larger deliveries to Germany (+7%), Italy (+42%) and Belgium (+11%).

Regarding the increased pipeline deliveries from Norway, the largest part of the delivery increase in the Norwegian pipeline was explained by the UK, where gas imports grew from 21% of total national consumption in 2007 to 26% in 2008. Norwegian deliveries to the UK increased by 8.9 bcm, representing 27.3% of the total Norwegian deliveries, versus 19.1% in 2007.

In 2008, Russia accounted for 39% of total EU-27 gas imports, followed by Norway (29%), Algeria (16%), Nigeria (4%), Libya (3%), Qatar (2%), Egypt (2%) and Trinidad & Tobago (2%).

According to Cedigaz, Gazprom kept its 27.5% market share of European markets deliveries, while Sonatrach increased its exports by 8.9% and maintained its market share of almost 10%. Libyan NOC also increased its exports, mainly to Italy.

In Russia, development of the Yamal mega-project started late 2008, with both pipeline construction and field development at Bovanenkovskoye, comprising over 8 tcm of gas, is now underway.

Algeria also holds important potential gas reserves, especially in the remote southwest of the country, but it has experienced a slowdown in exploration and appraisal drilling in 2008 in response to its punitive tax changes in recent years.

Imports from Norway significantly rose in 2008 (+9.4%) thanks to the production ramp up of recent new fields (Ormen Lange, Snøhvit, Njord and Strajford), which increased Norwegian LNG imports to the EU-27 from 0.14 bcm in 2007 to 1.38 bcm in 2008.

As an illustration of the Norwegian potential remaining fields to be discovered, Royal Dutch Shell announced in June 2009 it has made a gas discovery in the Norwegian Sea called Gro, which Norway's Petroleum Directorate said may be the biggest (estimated between 10 and 100 bcm), since the giant field of Ormen Lange.

While the EU is trying to set up new routes to reduce its dependency on Russian gas imports, gas companies pursued discussions on a one-to-one basis with Russia to participate in its pipeline projects Nord Stream and South Stream

EU-27 countries pursued discussion about new pipelines to reduce their dependency on Russia. These pipelines projects (see Table 4.4) will increase gas supply from countries such as Algeria (Galsi, Medgaz, Transmed), or from the Caspian region (Nabucco, Turkey-Greece-Italy pipeline, White Stream).

The Nabucco pipeline is the EU's flagship project. It will offer an alternative to Russian gas transporting natural gas from the Middle East, Central Asia and Caspian region to Western Europe. The expected supply capacity is forecasted at a maximum amount of 31 bcm/year of natural gas, representing 6% of the annual European consumption and should start operations in 2014.

The greatest challenge for the Nabucco project remains: how to find enough gas to fill in the pipeline. Azerbaijan has long been seen as a potential key source of gas. But Gazprom signed an agreement in mid 2009 to import natural gas from Azerbaijan and then pipe it to Europe, and also gets the priority in buying gas from the second phase of the Shakh Deniz Caspian Sea field.

Irak and Iran could also be a possible source of supply but the issue is complicated by the tenuous political and security situation in the countries. Turkmenistan, which is looking for alternative markets for its energy following a dispute with Russia, could be another potential supplier. But, to be connected to Nabucco in Baku, the problem of the crossing of the Caspian Sea resides without a resolution for the time being.

Gazprom supports two projects, its South Stream pipeline project led with Eni, competing with Nabucco project. The South Stream project pipeline will take Russian gas under the Black Sea to Europe, providing an alternative route from the Ukraine. The initial planned capacity of 31 bcm/year has been doubled and the pipeline should start by 2015. In

Key issues in Switzerland

The Swiss energy **market issues in 2008/2009** are the **liberalization of the electricity market; the regulation of electricity prices; the formation of Alpiq**; and **necessary investments.**

The **liberalization of the electricity market for large-scale customers** (>100 MWh per year) **started in January 2009**. The switching rate so far is very low due to a price gap between long-term contracts and the market price. Despite this, **a full liberalization of the market for small consumers in 2014 seems to be likely**. The lessons learned on the German market will be very useful.

Market prices are the second regulatory issue: a conflict existed between the Utilities, Swissgrid and the Federal Electricity Commission. ElCom reduced the aspired price rises by 50% by regulating the network usage fees and demanded a pay freeze for 2010.

A third topic is the merger of Atel and EOS to form **Alpiq – the new Swiss market number one** replacing the former number one Axpo and BKW. Despite this consolidation of the market structure, the ownership structure of these Utilities (i.e. the strong cantonal influence) remains in place which influences the market strategies of the companies.

The fourth issue is **grid and generation investments.** These **are hampered** not by the economic crisis but **by protracted admission procedures and public resistance.** Thus, the crisis plays a marginal role for the investment programs although it has a decreasing effect on the revenues of the Utilities.

2008, Serbia, Hungary and Greece officially joined the South Stream project. In July 2009, three weeks after an intergovernmental agreement was signed between Turkey, Romania, Bulgaria, Hungary and Austria for the Nabucco route, Moscow signed with Ankara a protocol routing the pipeline through the Turkish territorial waters. Lately, EDF showed its interest to acquire 10% equity in the project, in order to secure long-term gas supply contracts with Gazprom to fuel its gas plants.

The second project is the Nord Stream project, led jointly with E.ON, a 1,200 km long offshore natural gas pipeline which will ensure supply between Russia and Northern Germany across the Baltic Sea. The first gas delivery is scheduled for late 2011, with a capacity of 27.5 bcm/year. Wingas and Gasunie are part of the project and GDF SUEZ is about to acquire a 9% participation stake in this project.

All this illustrates the difficulty in switching from national security of supply concerns to a Europe-wide view.

Another element that is putting pressure on European gas markets is the creation of a gas cartel which became more concrete with the adoption of a charter of the Gas Exporting Countries Forum (GECF) in 2009

Until the seventh ministerial meeting which was held on December 23, 2008 in Moscow, the GECF operated without charter and fixed membership structure. During this meeting, it went one step further in the creation of a gas cartel with the adoption of its charter to be headquartered in Doha, Qatar. At the eight ministerial meeting in June 2009, the energy minister of Qatar was elected as chairman of the GECF and Algerian energy minister was elected as vice-chairman. The Secretary General will be elected during the ninth ministerial meeting in Doha.

The GECF regroups Algeria, Bolivia, Brunei, Venezuela, Egypt, Indonesia, Iran, Qatar, Libya, Malaysia, Nigeria, the United Arab Emirates, Russia and Trinidad-and-Tobago, countries which represent about 77% of the worldwide natural gas reserves and 48% of worldwide gas production. The Netherlands, Kazakhstan and Norway have so far attended the GECF meetings as observers.

Western Europe is watching the meeting closely, worried that the group will try to set gas prices and manipulate supply. Some GECF members voiced concern in June 2009 over falling gas prices. Iran's OPEC governor said the members had agreed to form a committee to study ways to stabilize the global gas market, adding that the issue would be discussed in the organization's summit in October 2009.

Unconventional gas could be, in the next decade, a potential good surprise to increase Europe's gas reserves and reduce dependency

Unconventional gas encompasses several sources of natural gas that are getting more accessible as technology and geological knowledge advances: deep natural gas (4,500 meters or deeper underground), tight gas (gas trapped in unusually impermeable hard rock, or in a sandstone or limestone formation that is unusually impermeable and non-porous), shale gas, or coal bed methane (natural gas contained in coal seams).

While American shale-gas recovery efforts are booming, Europe has no shale gas production yet, but activities to explore the European shale gas potential are increasing. Europe has numerous sites of potential interest which include northeast France, the Alum Shale in Northern Europe and carboniferous shales in Germany and the Netherlands. The American Association of Petroleum Geologists (AAPG) estimates European shale resources of between 3-14 tcm.

Several evaluations are going on: OMV from Austria has been conducting tests of gas shale in the Vienna Basin; Royal Dutch Shell is exploring for gas shale in southern Sweden; Lane Energy is exploring in Poland; MOL in Hungary; and Eurenergy Resource Corporation in southern England's Weald Basin.

While new gas supplies would be welcome by EU officials, it will take years to develop Europe's gas resources, assuming that doing so is economically feasible.

LNG

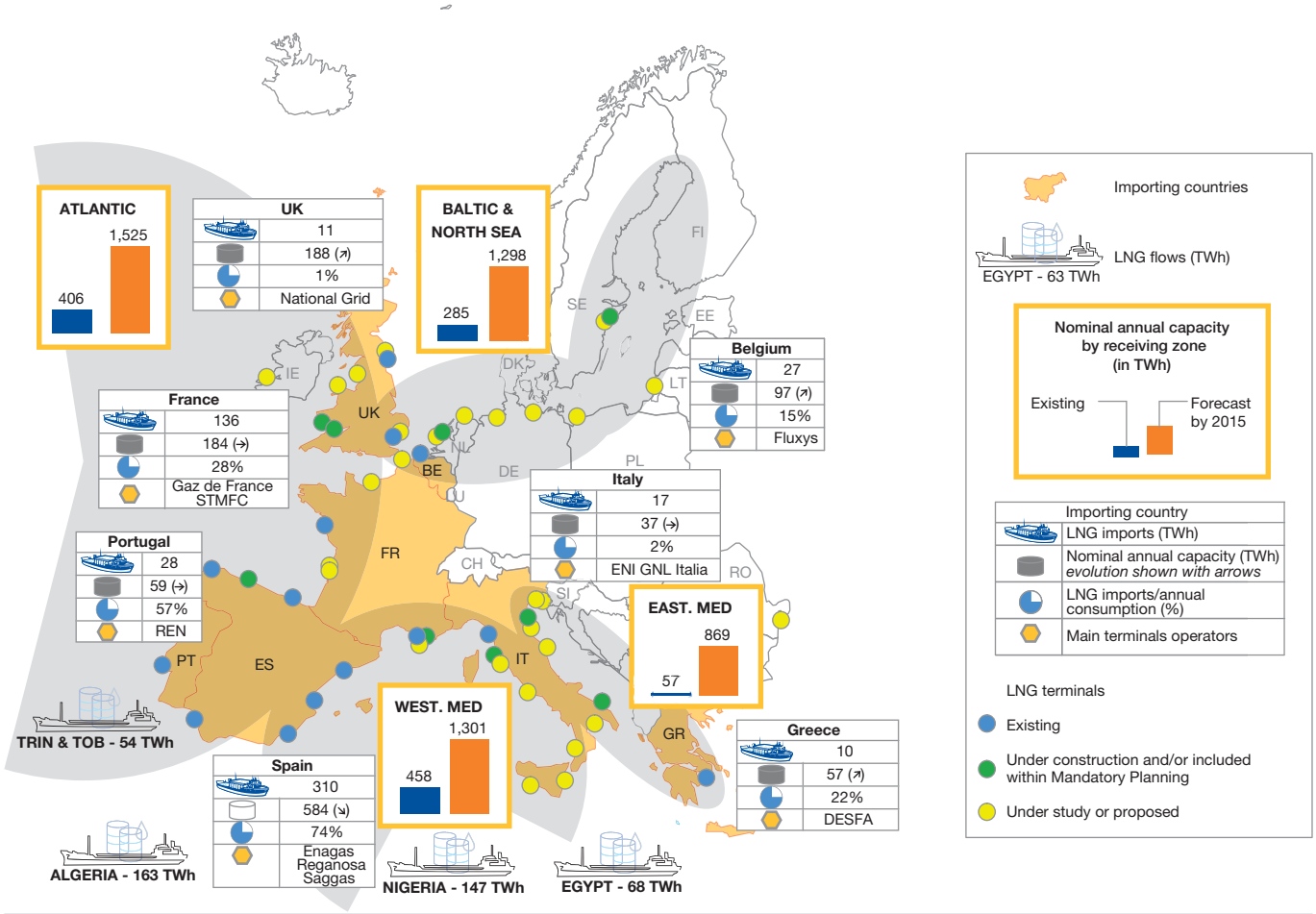
In 2009, European and global LNG industry have come to a halt

The industry slowed down after years of growth. The worldwide LNG trade increased at a rate of 7.7% over the past 10 years and the LNG trade to the EU grew at an even higher rate over the same period at 10.6%. The review of the first half of 2008 showed that the global market had a tight supply/demand balance coupled with rising energy prices. There were several factors which contributed to the global supply-demand squeeze:

- 9% per year global increase for demand has been witnessed in the last three years but global LNG trade in 2008 remained the same as 2007 at 226 bcm due to production issues from the liquefaction end;
- Asian demand for LNG grew 5% year-on-year, and with a long-term outages at nuclear power stations in Japan, they reached record imports in March 2008;
- Liquefaction capacity is equal to less than half of all regas capacity worldwide. With limited supply and excess storage capacity, increased competition for limited supplies resulted in high demand for spot price cargoes which now accounts for greater than 20% of global trade;
- Various issues from feed-gas short-fall, force majeure, technical problems as well as delayed start-ups on the liquefaction production end all contributed to the perfect squeeze in supply.

The above scenario changed in the second half of 2008 and into 2009 as the impact of the global financial crisis took effect in driving down global demand. Global demand for 2009 is expected to decline by 9% and down by as much as 13% in specific countries such as Japan, Korea and Taiwan before it rebounds strongly in the following years. On the opposite end, the supply shortfall has been reversed with unprecedented increase in liquefaction production which will come onto the market in 2009 primarily from delayed

Table 5.1 Map of LNG terminals and flows (2008)



Source: GIE gle, BP statistical review of world energy 2009 – Capgemini analysis, EEMO11

start-ups from Qatar's super-trains, Snøhvit LNG in Norway, Tangguh LNG in Indonesia, and Sakhalin-II LNG in Russia. The supply increase is expected to be 9% per year from 2009 until 2011.

The market has had a dramatic shift in requirements with the urgent issue being to find sufficient outlets to dispose of this substantial new supply. This is in sharp contrast to just over a year ago when the LNG industry was facing a need to secure LNG volumes and cargoes to meet steadily growing demand.

However, Table 5.1 which is based on data from June 2009 from GSE (Gas Storage Europe) shows that major investment in regas is still taking place when looking at the capacity forecast for 2015. The long-term view shows that the current glut of LNG supply is only temporary and as economies recover from the economic downturn the demand for LNG will continue its upward trend.

The financial crisis has had a limited impact on regasification investment

As a matter of fact, Europe has moved ahead with its long-term investment strategy to diversify energy dependence from Russia, and has considered plans for the long-term scenario when piped-gas supply reduces. 2009 has seen a number of terminals move into the operation stage with Adriatic LNG (Italy), South-Hook LNG (UK), Dragon LNG (UK), Grain LNG expansion (UK) and the Fos Cavaou LNG terminal (France), which is set to come onstream in Q4 2009. As of last year, caution must be taken as many projects have only been announced and no final investment decision has been authorized. However, Gate LNG in Netherlands, Musel LNG in Spain and Livorno LNG in Italy are three projects that have moved into construction stage showing that financing is available in these tight markets.

However, some investments have been affected due to the crisis. Greek gas Utility DEPA has pushed back investment in a new terminal in Crete as well as increasing capacity at the Revythoussa import terminal due to dampening gas demand. Expansion of the Bilbao LNG terminal in Spain has been pushed back because the Basque government has been having financial difficulties and is not eager to invest its own money which has created a deadlock with the other four equal partners.

While considerable investment is taking place in the coming years, it is Spain that is leading the import market with a 58% share of European demand

Spanish LNG imports increased by 18.8% in 2008 which can be attributed to increased use of LNG to compensate depleted hydropower reserves (see Table 5.2). France's LNG imports dropped by 2.9% in 2008 but the country is still the second biggest importer of LNG in Europe with a share of 25%. Portugal and Greece followed up 2007 with another year of positive growth in 2008 with existing expansion and new terminals in the pipeline. Belgium, Italy and the UK's consumption of LNG makes up a small portion to their overall energy demand. However, the year-on-year drop, which

Table 5.2 LNG imports to Europe (2008)

In TWh	From												
To	Trinidad & Tobago	Belgium	Norway	Oman	Qatar	Algeria	Egypt	Equatorial Guinea	Libya	Nigeria	Total imports	% of total Europe	% change 2008 vs. 2007
Belgium	0.9	-4.3	0.9	-	28.6	-	0.9	-	-	-	**26.9**	5.0%	-21.5%
France	0.9	-	2.7	-	-	82.1	11.4	-	-	38.9	**136.0**	25.2%	-2.9%
Greece	0.9	-	-	-	-	7.6	1.7	-	-	-	**10.2**	1.9%	16.0%
Italy	-	-	-	-	-	16.8	-	-	-	-	**16.8**	3.1%	-35.8%
Portugal	-	0.5	-	-	-	-	-	-	-	27.9	**28.4**	5.3%	13.9%
Spain	46.7	1.9	11.3	1.8	55.3	52.9	53.0	0.9	5.7	80.7	**310.3**	57.5%	18.8%
United Kingdom	5.1	-	-	-	1.3	4.0	0.9	-	-	-	**11.2**	2.1%	-28.8%
Europe	**54.3**	**-1.8**	**14.9**	**1.8**	**85.2**	**163.4**	**67.9**	**0.9**	**5.7**	**147.4**	539.8	100%	5.6%
% of total Europe	10.1%	-0.3%	2.8%	0.3%	15.8%	30.3%	12.6%	0.2%	1.1%	27.3%	-	-	-
% change 2008 vs. 2007	92.7%	-	885.7%	41.7%	5.6%	-6.0%	10.0%	-	-30.3%	-5.3%	-	-	-

Source: BP statistical review of world energy 2009 – Capgemini analysis, EEMO11

occurred due to increased usage of piped gas as Asian buyers pulled supply away from European markets, is still significant.

The sources of LNG supply changed significantly from previous years where declining supply from Egypt and Trinidad & Tobago in 2007 reversed its trend in 2008 to meet Spain's increased demand. Norway's big increase in supply was attributed to the start-up of StatoilHydro's Snøhvit LNG development which came online at limited production due to technical difficulties. These have now been overcome and at full production it will play an important role in providing secure supply in Europe. However, the start-up of Qatar's mega-trains will provide the greatest source of supply to the European and global LNG market.

While investment is moving forward at a fast pace the driver is about energy security rather than current needs

The UK is a prime example where diversification via LNG investment does not guarantee a better utilized terminal for the short-term. Piped gas via North Sea assets and Norway continue to dominate supply resulting in a 29% drop in imports for 2008 (the UK witnessed a 59% drop in LNG imports in 2007). The likelihood of under-utilized terminals will only increase in a depressed demand market with increased competition between the recently expanded Grain LNG terminal and the new South Hook and Dragon LNG terminal. While investment in regasification is important for Europe, unless contracted supplies are agreed with producers then utilization will remain a pressing issue as un-contracted LNG will move to zones such as Asia where a premium was paid in 2008.

One player which has realized the risk of under utilization as well as the commercial opportunities in volatile periods is the Zeebrugge LNG Terminal. Zeebrugge is the first terminal in Europe to install a facility to re-liquefy the gas for export allowing their customers to exploit commercial opportunities. Since the service was introduced in late 2008, the terminal has loaded seven cargoes to other destinations in just under a year.

Europe's strategy for energy diversification and security of supply lies in the hands of the producers

Final investment decisions (FID) in liquefaction plants are needed to meet the growing imbalance of continued regasification investments (only one FID was made in 2008 and none so far in 2009). The long-term view is that the current glut of LNG supply is only temporary and as economies recover from the economic downturn, liquefaction investment is needed to prevent years such as 2008 where the demand/supply imbalance drove prices up and shifted LNG to Asian markets.

In the long-term the key players in the industry will be those who can cover the whole value chain from liquefaction, shipping/trading as well as import terminals. GDF SUEZ, BG Group, Qatar Gas and Eni are all examples where significant investment in all three areas has taken place so as to benefit from arbitrage opportunities.

The drop in Asian demand coupled with new supply in 2009 has allowed LNG to feed the European markets. However, in the longer-term, liquefaction FIDs are needed to allow LNG to trade competitively with Asian LNG demand and piped gas in Europe.

Key issues in Portugal

In the last few years, **Portugal has been keen on Renewable Energy Sources (RES) development**, due to strong government incentives, which resulted in recent successes both in commercial and technical fields. These included EDP Renováveis which is ranked fourth in the world for RES installed capacity and the building of the first commercial wave plant in the world (Pelamis-2008).

The liberalized markets in Portugal are still not working at full speed, with different rhythms between electricity (opened since 2006) and gas (to be fully opened in January 2010). In only two years, the tariff deficit has reached €2 billion.

In the first semester of 2009, **the liberalized electricity market experienced a ten-fold increase to reach 27% of the total consumption**, causing the incumbent's (EDP) market share to reduce from 93 to 65% (volume), while increasing the Spanish challengers share (Iberdrola, Endesa and Union Fenosa). As for gas, the market remained controlled by Galp Energia, which is determined to double their supply in the next five years to 12 bcm, although EDP is expanding their client base and reached 30% market share (clients).

Recent movements of consolidation in the downstream at the Iberian level (Endesa and Enel; Gas Natural and Union Fenosa) **are putting pressure on the Portuguese players** to develop dual fuel offers and to further increase their geographic reach. EDP, with its recent acquisitions of Gas Natural assets, secured their second place in the Iberian gas marketplace.

Additionally, there is a trend towards the deepening of relationships with National Oil Companies, such as Sonatrach (Algeria) with 2.25% of EDP, or Sonangol (Angola) with a 15% indirect stake in Galp Energia (controlling 45% of Amorim Energia which owns 33.34% of Galp Energia).

Gas Wholesale Markets

Wholesale gas spot prices increased by 68% in an unusual flat pattern in 2008, with no seasonality. They de-correlated in the winter 2008/2009 from European gas long-term contracts prices in a gas-to-gas competition market, where gas is oversupplied worldwide due to the economic crisis

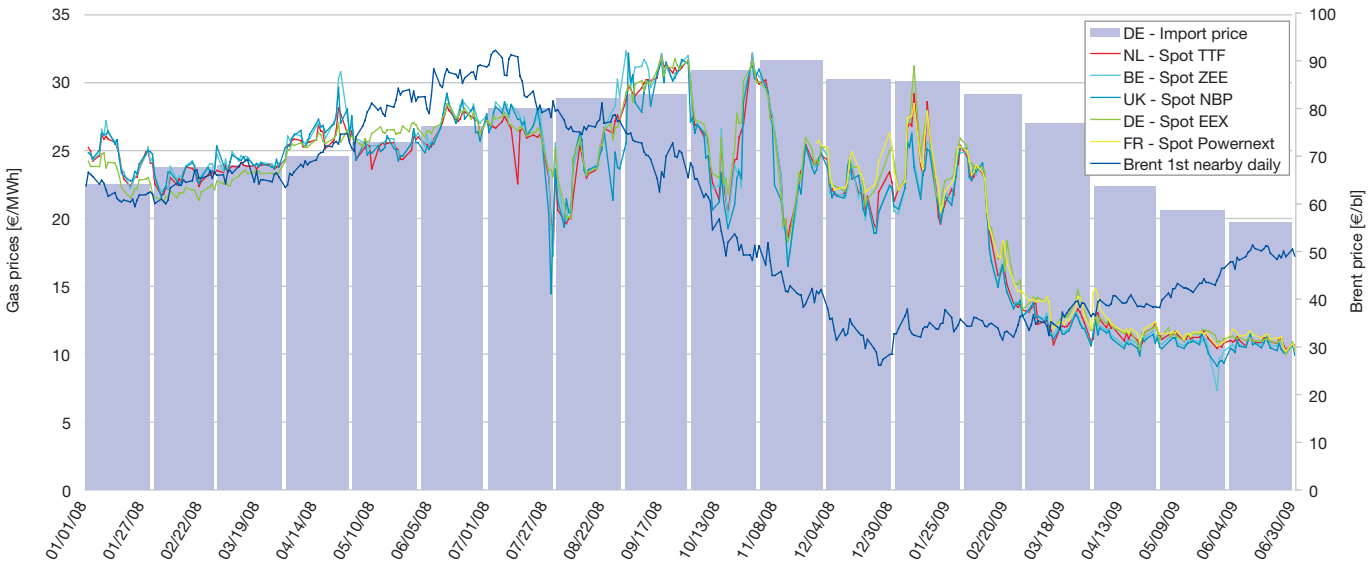
European wholesale gas spot prices averaged €25/MWh in 2008, posting a 68% increase in a similar fashion on the three main European trading hubs (the UK, Belgium and the Netherlands). Zeebrugge (Belgium) stayed the most expensive and NBP (UK) was the cheapest market. They showed an unusual pattern with prices during the summer of 2008 being above those in winter 2007/2008 and winter 2008/2009 despite comfortable storage levels above 40% on average in Europe.

2008 started with prices around €25/MWh (see Table 6.1), which was in line with European gas long-term contracts prices in a relative quiet winter 2007/2008 where storage levels remained high. This price pattern is usual in winter when wholesale gas markets and gas long-term contracts prices are correlated. In April and May 2008, technical difficulties in the North Sea fields made surprisingly the UK market a net importer from Zeebrugge. Thus, UK prices stayed linked to European gas long-term contracts prices in Q2 2008. Then the oil price rallied at the beginning of 2008 which made European gas long-term contracts more and more expensive compared to the wholesale markets i.e. the spread reached €10/MWh. Consequently, the gas exports from the UK to the continent became high because of European incumbents filling their stocks for the next winter and finding it economical to buy spot compared to high forward prices.

Reduced flows from Norway to the UK via the Langeled pipeline and a series of maintenance, incidents (Morecambe) and strikes (Forties) on the system also helped the UK prices to maintain the €25/MWh level during the summer of 2008. LNG imports were not available due to Asia seeping out the worldwide gas markets: only two cargoes arrived at the Grain LNG terminal in the first nine months of 2008. In late August 2008, when the interconnector between UK and Zeebrugge shut for maintenance during a fortnight, the UK market temporally came off. As soon as the interconnector re-opened, the UK market rebounded above the €25/MWh threshold, making September 2008 the most expensive month of the year with an average price of €29.9/MWh in alignment with the forward prices of the coming winter.

Despite a report issued by the British TSO warning of supply risks, the winter 2008/2009 season started with a sharp price fall, down to €20/MWh because of a sudden increase of Norwegian flows into the UK system for contractual or budgeting reason (the Norwegian have annual volume targets). The cold period at the end of October and beginning of November 2008 was feared by the market, which overreacted at the beginning of the winter period and prices quoted above €30/MWh for a week. Then, the system turned out to be well equilibrated.

Table 6.1 Gas spot prices (2008 and H1 2009)



Source: Platts PowerVision, BAFA, Powernext, EEX, SG Commodity Research – Capgemini analysis, EEMO11

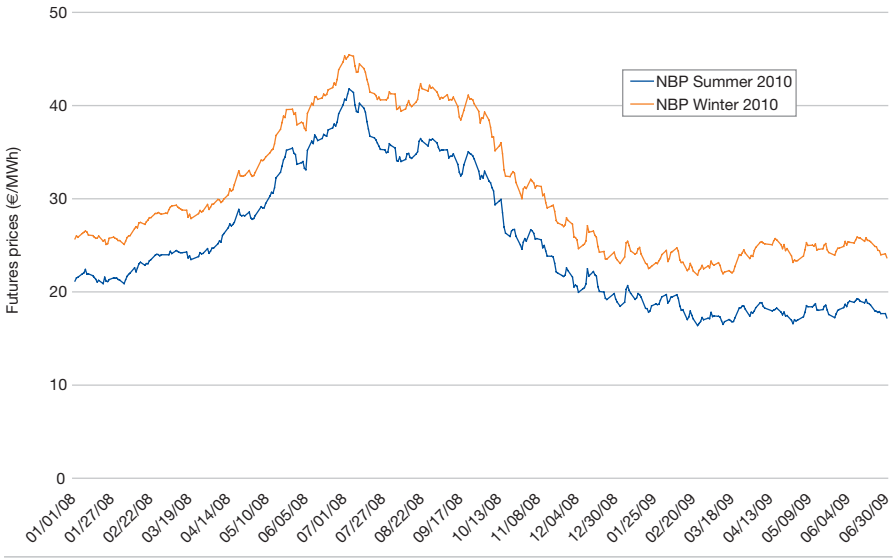
The Russia-Ukraine crisis in January 2009 proved to have limited impact on the prices as the UK prices jumped to just over €25/MWh for a short period of time. The Dutch prices revealed to be more sensitive with the spread between UK and the Netherlands reaching €4/MWh. The Kvitebjorn field in Norway resumed operations after a shut down of five months following an outage in August 2008, which had significant impact on forward prices. Despite European stocks levels falling because of the cut in delivery of Russian gas, the market kept confidence in the alternative supply sources, such as the world oversupplied LNG market. Furthermore, the lower gas demand linked to the economic crisis made the physical players confident.

From mid February 2009 onwards the market entered into a depressed mood and the wholesale gas markets prices came off abruptly to fluctuate in the €10-12/MWh range. A drop in demand and stable inflows from Norway were the reason behind this decrease. With this price level, European storage levels refurbished more rapidly than in 2008, from 30% in March to almost 80% in August, showing some arbitrage with the forward markets. Wholesale gas spot prices stayed below gas long-term contracts prices, which is usual for summer periods.

European wholesale gas forward prices followed the oil price, reaching their peak in July 2008. The spread between Zeebrugge and the UK remained stable whereas the Netherlands became the most expensive place as seen by the market for the future

The UK gas forward prices (October 2010 annual product) averaged €31.2/MWh in 2008 with a minimum at €21.2/MWh and a maximum at €43.6/MWh in a highly volatile market (see Table 6.2). In H1 2009, the average price was €21.1/MWh with a fluctuation of +/- €2/MWh. These price movements were explained by the development of oil prices and its roller coaster evolution in 2008.

Table 6.2 Gas futures prices (summer 2010 and winter 2010)



Source: Platts PowerVision – Capgemini analysis, EEMO11

Zeebrugge gas forward prices followed in parallel to the UK gas forward prices, just a fraction higher of €0.2/MWh. The market usually sees summer periods in Zeebrugge a little more expensive due to the usual September shut down of the Interconnector, which led to decoupled markets and the UK being usually at this period flooded with gas.

Dutch gas forward prices followed the same pattern but were slightly de-correlated from the UK and Zeebrugge prices and became the most expensive place compared to the UK and Zeebrugge in Q2 2009. Both seasonal products were concerned by this evolution. The markets followed the average realization of the spread between the UK and Dutch gas markets on the spot which can be understood on one hand by the larger sensitivity of the Netherlands to a political crisis (e.g. the Russia Ukraine crisis of January 2009), and on the second hand

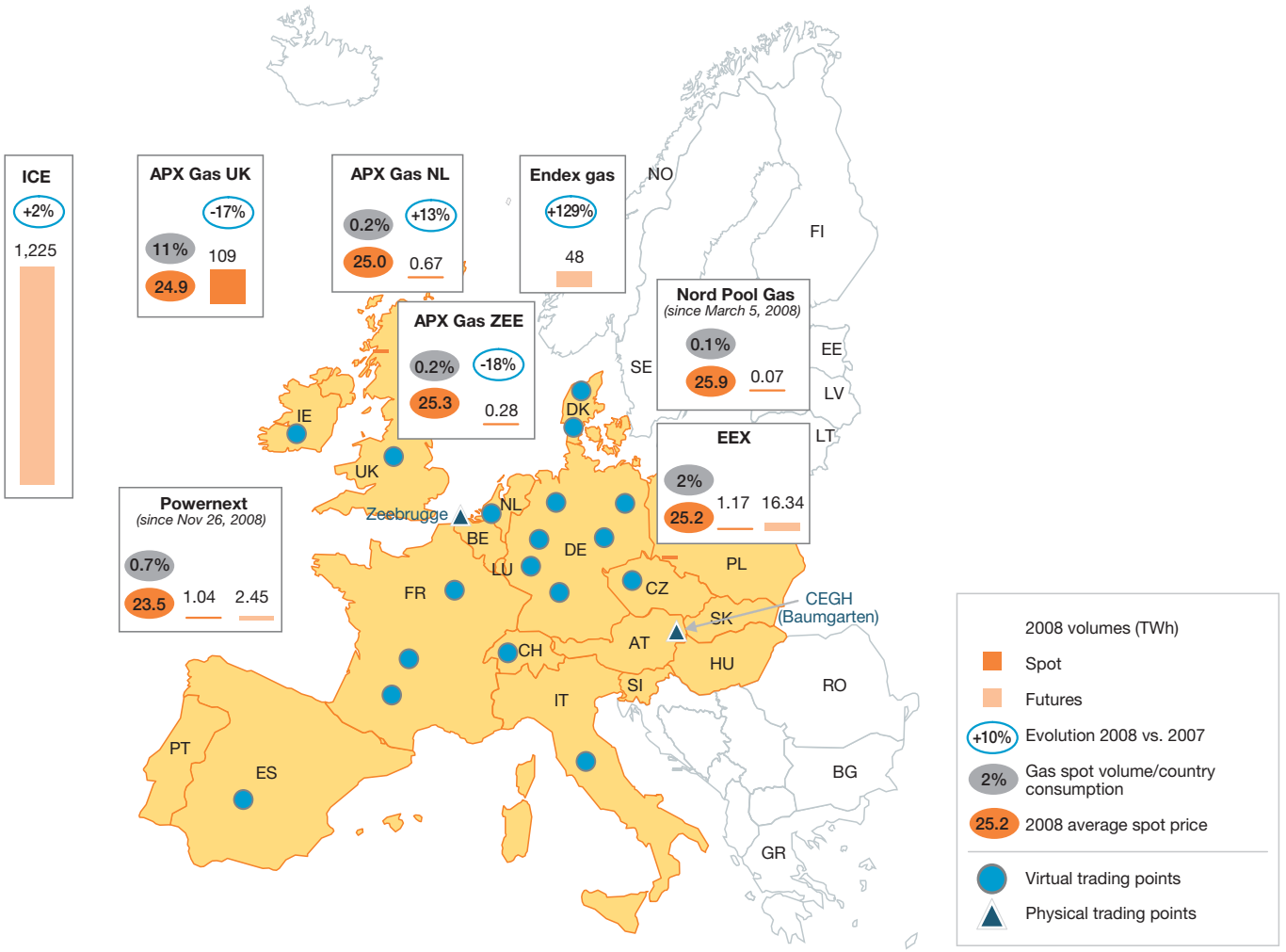
by the influence of world market in the UK (e.g. the depressed American market which fell to 2002 levels in 2009).

The spread between the winter and summer products increased from the €4-5/MWh range at the beginning of 2008 to the €6-7/MWh range in Q2 2009. This reflected the view of the market that the coming summer periods may offer some gas-to-gas competition whereas the winter periods stay linked to the oil prices. The oil curve, which shows higher long-term prices compared to short-term ones, implies increasing gas prices for the coming winters.

European gas long-term contracts prices showed the usual pattern of a delayed oil indexation and reached their maximum in November 2008 at approximately €42/MWh. Then, they came down to settle at about €20/MWh in June 2009

The prices of European gas long-term contracts show usually a three to six months delay compared to oil prices. Given the oil price movements in 2008, they reached a new record in November 2008, corresponding to the all time record price of oil in June and July 2008. Their average increased by almost 50% in 2008 compared to 2007 and settled at around €31.5/MWh, well above wholesale gas spot markets prices. Exchange rates attenuated the oil prices movements.

Table 6.3 Map of gas trading (2008)



Source: Gas Exchanges web sites, GIE gte – Capgemini analysis, EEMO11

In 2009, the European gas long-term contracts prices sharply came off, reaching €20/MWh in June 2009 corresponding to Brent prices in the US$40-50/bl range.

European gas long-term contracts prices and wholesale gas prices de-correlated in winter 2008/2009, the latter being €10 to 15/MWh lower. It differs from the usual pattern which shows winter wholesale gas prices close to gas long-term contracts prices and summer wholesale gas prices below gas long-term contracts prices. In fact, in the winter 2008/2009, shippers probably used at the maximum their flexibility in their gas long-term contracts to limit their off-take and bought on the wholesale gas markets or used their stocks. In addition, they probably sold in the more attractive forward markets their take-or-pay volumes.

Worldwide LNG demand was led by Asia in 2008 and turned into an oversupplied market in 2009

LNG brings arbitrage opportunities between the three continental markets (Europe, Asia and North America). About 10% of marketed LNG is "free" from long-term contracts and is used by shippers to seize the opportunities.

The worldwide LNG market experienced its first non-growth in traded volume in 2008 for the last 30 years. The US drop in imports was compensated by Asia with an increase of imports from Japan to produce electricity to compensate nuclear outages and from China to limit pollution in the Olympic year. Many slots in European LNG terminals, usually reserved for long-term contracts, did not find interest as net-backs were in favor of Asia in 2008.

Due to the crisis, prices on the three main areas (US, Europe and Japan) were convergent in 2009. There were 54 LNG ships unloaded in Zeebrugge in H1 2009 compared to 37 in 2008.

Traded volume increased significantly, and the German hub sounds to be the most promising place for continental Europe, competing with the Dutch one

The traded volumes increased by 57% in 2008 on continental European markets (see Table 6.3). The largest increases came from the Dutch market (TTF) followed by the German ones (EGT and BEB). The Zeebrugge hub lost market share, but stayed second behind TTF. The UK market remained the most liquid market with traded volumes being five times higher than on TTF. The traders wondered when volumes on the German market would be higher than the ones on Zeebrugge.

In 2008, about 10 bcm of gas were made available by incumbents (E.ON, Eni, etc) through gas release programs. In 2009, as some gas release programs end, the volumes are expected to be lower.

In 2008 and 2009, some new infrastructures were put into operations and helped (will help) develop the European gas markets. For instance:

- First delivery of LNG to South Hook terminal in the UK took place in April 2009 importing gas from Qatar;
- The Medgaz pipeline between Spain and Algeria plans to start operations in 2010, as well as the LNG terminal of Fos Cavaou in the south of France in late 2009.

Gazprom took 50% of the Baumgarten hub operator in Austria from where a large part of the Russian gas is currently imported into the rest of Europe.

Market design of wholesale markets found some impetus from exchanges and Transmission System Operators (TSOs)

Exchanges

Gas players are mainly trading on Over-The-Counter (OTC) markets. The main exchanges offering gas services are EEX in Germany, Powernext in France, APX and Endex in the Netherlands. The last two announced their merger in September 2008 and their intention is to develop a British gas exchange. Powernext started gas spot and futures on November 2008 and EEX gas intra-day on July 2009.

APX has plans to launch a LNG market at terminal level. However, it is refrained by the customs of the industry to negotiate bilaterally cargos with limited transparencies through price agencies.

Projects in the Belgian, Austrian and Italian gas exchanges were discussed in 2008.

TSOs

In France, the number of gas zones decreased from five to three after the creation of PEGN regrouping the three zones of the North, East and West of

Key issues in Sweden

Wind power increased by more than 40% for the second continuous year and now contributes more than 2 TWh to the total supply[a]. The Swedish energy authority concluded that **in order to achieve the renewable targets set by the EU, focus must be on hydro** as this is the main balancing power in Sweden.

The rollout of remote meter readers was completed in July 2009. Sweden announced in January 2009 that it would drop, as the last EU country, "ex post" tariffs for distribution and would introduce "ex ante" tariffs instead.

Vattenfall acquired 49% of the shares in Nuon in a deal worth €8.5 billion as part of its strategy to grow in continental Europe. Norwegian **Statkraft entered the Swedish market through an asset swap with E.ON** (assets versus shares). With this deal worth €4.5 billion, Statkraft is now the fourth largest generator in Sweden.

Investment continues despite a slump in the economy. Utilities are preparing to spend some €30 billion over the next ten years. Of this €10 billion is dedicated to the network and the rest for generation (of which €10 billion is for wind)[b].

Plug-in hybrid vehicles is on the agenda of the Utilities. Estimates show that 600,000 vehicles will lower the total Swedish CO_2 emissions by 20%[c]. They will consume some 1.5 TWh annually, which is fully feasible with the current capacity.

a) Elåret 2009, Swedish Energy Agency
b) Swedish Energy Agency survey
c) Elforsk

France. The merging of the South and South-West zones was postponed to 2012.

In Germany, the regulator favored the reduction of gas zones, from 12 in October 2008 to six in October 2009, with the creation of GASPOOL and NetConnect in the high calorie network.

In general traders are calling for the merging of transport zones to concentrate liquidity on fewer trading places.

In 2008 and 2009, some new market mechanisms were put into operations and helped develop the European gas markets. For instance:

- Fluxys offered in its Zeebrugge LNG facilities the opportunity to store and re-liquefy gas;
- Fluxys made three improvements to facilitate access to its network, known as being physically and contractually bottlenecked;
- A pilot experiment supported by the EC on the Dutch / German border in order to organize a secondary capacity market proved to be successful;
- A consultation was initiated to set-up financial reverse-flow products on the BBL pipeline, which physically links the Netherlands to the UK in a unidirectional manner.

Transparency over wholesale markets raised concerns and some first steps were taken even though some more improvement is needed.

The price movements of 2008 had some impact on the political scene on two topics: linkage between oil and gas prices and transparency of the markets. Little progress was seen on the first issue, whereas much was done to increase transparency and access to infrastructures (transport, cross-border, storage, LNG terminals) thanks to regulators and TSOs. For instance, in April 2009, the Dutch TSO started publishing real time data such as import, export, demand, storage injection and withdrawal. It is getting closer to the British TSO which is publishing larger information on the British gas system.

2008 is the first complete year of storage data in Europe as provided by GSE, the association of European gas storage operators. It launched in January 2008 an inter-operability platform to help shippers to move gas in Europe.

Traders associations kept complaining about the lack of transparency of the market, for example on planned maintenance and the absence of cross-border capacity recalculation from TSOs. The crisis between Russia and Ukraine demonstrated the necessity to monitor in a transparent manner the European system.

The development of gas exchanges brought some more transparency on prices and volumes, although the meaningfulness of prices is still questionable.

The crisis impacted demand significantly leading to a convergent worldwide gas market. Liquidity might have been temporarily affected

The economic crisis had some impact on the gas wholesale markets not only on prices, but also on traded volume and liquidity. This latter impact is difficult to assess, but in the developing European gas wholesale markets, the crisis may have slowed down the development for a few months. Neither massive withdrawal of players was announced, nor any unusual liquidity drop although some feared about it.

The drop in demand led to a price convergence across the world, which mostly impacted LNG markets.

Gas Retail Markets

European gas consumption has slightly increased, especially thanks to the thermoelectric generation segment, but the trend has changed with a downturn which started in Q4 2008 and continued during H1 2009

In 2008, the European gas consumption amounted to 5,336 TWh (see Table 7.1). That represented a small increase (+2.0%) over the 2007 figures.

The top six countries, based on gas consumption, are the UK, Germany, Italy, France, Spain and the Netherlands. Together they account for 76% of total European consumption. The Netherlands has just been surpassed by Spain, which showed a strong demand growth in 2008 (+11%).

Globally, 34% of the gas consumed in Europe has been used for residential and commercial heating, 33% for industrial purposes and 26% for thermoelectric generation. The remaining 7% is for transport, losses, and system consumption.

The top six countries registered a positive trend except Germany (-1.1%) and Italy (-0.2%) where the gas consumption decreased. The general increase breaks the 2007 trend (-1.6%) and is driven by the thermoelectric sector (+10.3%) and the industrial sector (+3.2%). The residential and commercial consumption, on the other side, showed a downturn (-3.6%).

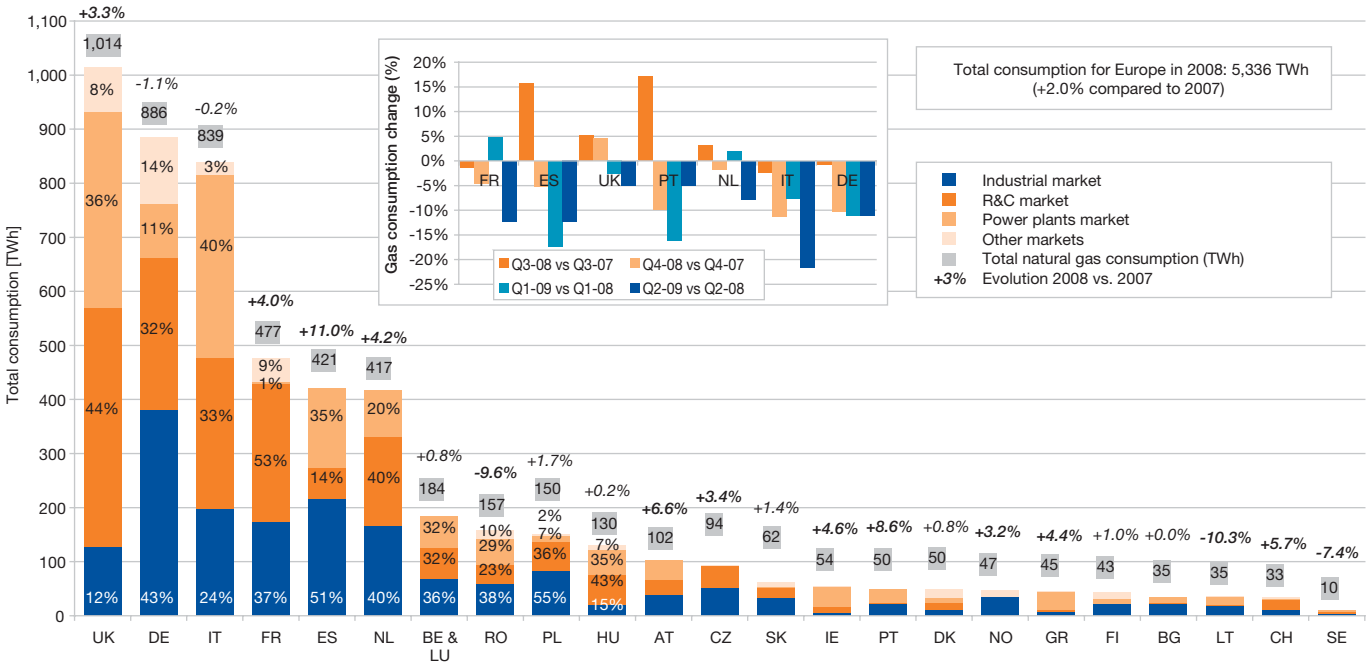
The demand grew over the first three quarters of 2008 and then started to decline in Q4 2008, where all the top six countries showed a negative trend, especially Germany (-10%) and Italy (-11%). The negative trend continued during Q1 2009 with Spain (-17%) and Italy (-8%) as the most affected countries, and Q2 2009 with all the top six countries showing negative trends ranging from 5 to 12%.

The downturn can be explained by the price increase (related to the oil price hikes of Q1-Q2 2008) and with the beginning of the crisis hitting the industry. While the price effect is going to end over the next few months, thanks to the oil price decrease of H2 2008, the industrial crisis is going to last during 2009 and maybe afterwards.

The growth of the gas consumption feeding the power generation segment followed the trend recorded in the previous years (+24% in 2007 and +21% in 2006). The increase has been even higher in the top six gas countries, where the consumption growth for the power generation segment has been as high as 12%. These countries are switching to CCGT plants, which perform well with respect to energy efficiency when compared to coal- and oil-fired plants, environmental protection and flexibility to cover power demand peaks.

The countries with the highest share of thermoelectric gas consumption are Ireland (66%), Latvia (59%) and Portugal

Table 7.1 Total gas consumption and size of I&C and residential gas markets (2008)



Source: BP statistical review of world energy 2009, Eurogas, SG Smart Energy Index – Capgemini analysis, EEMO11

(49%) while, among the top six countries, the greatest thermoelectric consumptions are reported in Italy (40%), the UK (36%) and Spain (35%).

In 2008, 33% of gas was employed to produce goods and services. Among the six countries, Spain (51%) and Germany (43%) took the lead for industrial use. This segment's gas consumption in 2008 shows a positive trend (+3.2% with respect to 2007 figures) driven by Belgium (+41%), Denmark (+29%) and Austria (+22%) but the increase is less evident for the top six countries (+1.6% with respect to 2007). In previous years, the industrial segment showed a structural reduction of the gas consumption related to the increased energy efficiency and the consequent decrease of the energy intensity. In fact, many countries used to show negative trends for industrial gas consumption despite the increase of GDP (Gross Domestic Product).

The economic crisis could mitigate this effect because companies are not willing to invest in energy efficiency measures now that they are going through financial difficulties and when low price makes energy efficiency investments less interesting. During the current period a reduction of the gas consumption from the industry of the Western European countries can be expected, due to both the structural trend and the effects of the crisis.

Some 34% of the gas consumed in 2008 was burnt for residential and commercial purposes. Countries with a high share of consumption were France (53%), the UK (44%) and the Netherlands (40%). This kind of consumption was also high in Hungary, Czech Republic and Poland.

The residential and commercial gas consumption in 2008 showed a negative trend (-3.6% with respect to the 2007 figures). This can be explained by the gas

Cost to Serve: a crucial indicator for retailers

During the first half of 2009 Capgemini benchmarked 20 European energy retail organizations in order to assess their Cost to Serve (CtS) in the mass market segment. Without much surprise, **most benchmarked retailers exhibit low (< 3%) or negative net margin in their operations, making CtS analysis so critical in this market.**

In our sample, full CtS is varied, ranging from €16 to 46 per contract, with the average standing at €26.

While best in class (i.e. retailers generating low CtS in very active markets) are in the €16 range some incumbents operating in competitive markets also exhibit good performance in the €22 range. Interestingly, organizations operating in a dormant or non deregulated market exhibit low CtS, ranging between €16 and €22, mainly due to fewer customer interactions, and a more simple offering structure.

Labor costs represent almost 60% of total CtS in average. Hence, best levers of optimization for CtS include:

- Lowering the contact ratio: in our sample it ranges from 0.6 to 2 with the average at 1.3;
- Lowering the call handling time: in our sample it ranges from 3'20" to almost 10' with an average at 6'13".

Overall, **outsourcing seems to be fairly well leveraged,** with almost two thirds of our sample's participants having outsourced at least some functions of their service centers. Overall the Utilities are leveraging their trust to their clients by using way beyond average Direct Debit payment instrument to lower their transaction costs. **Direct Debit is used for 50% of all payment transactions in our panel.**

However, **Internet self-service as well as Interactive Voice Recognition (IVR)** that could generate potentially lower transaction costs **seem not to be leveraged enough** compared to what we observe in other services. Telephone – accounting for 75% of all contacts in our sample – remains by far the most common interaction channel between Utilities and their clients. **Self-service strategies are still under-developed in the Utility industry, generating large potential for efficiency improvement.**

price rise observed in 2008 and the mild weather enjoyed during the winter months in many European countries.

Gas prices have strongly increased, especially in H2 2008, because of the oil price spikes in the first half of 2008

Compared to the 2007 levels, final prices for all consuming segments increased dramatically in 2008.

The oil price increase recorded in H1 2008 has influenced the gas retail price because of the commercial nature of the gas long-term supply contracts, which are indexed to the oil price. The gas retail prices recorded an all-time high during the summer of 2008; the drop of the oil price in the second half of 2008 did not affect the average gas final prices of the same year. In fact, the price formulas of the long-term contracts relate the gas price to the oil prices with a period of six to nine months, so any oil price change produces its results on end user gas prices with a time lag. The oil price decrease of the second half of 2008, therefore, generated gas prices decreases only in the first half of 2009.

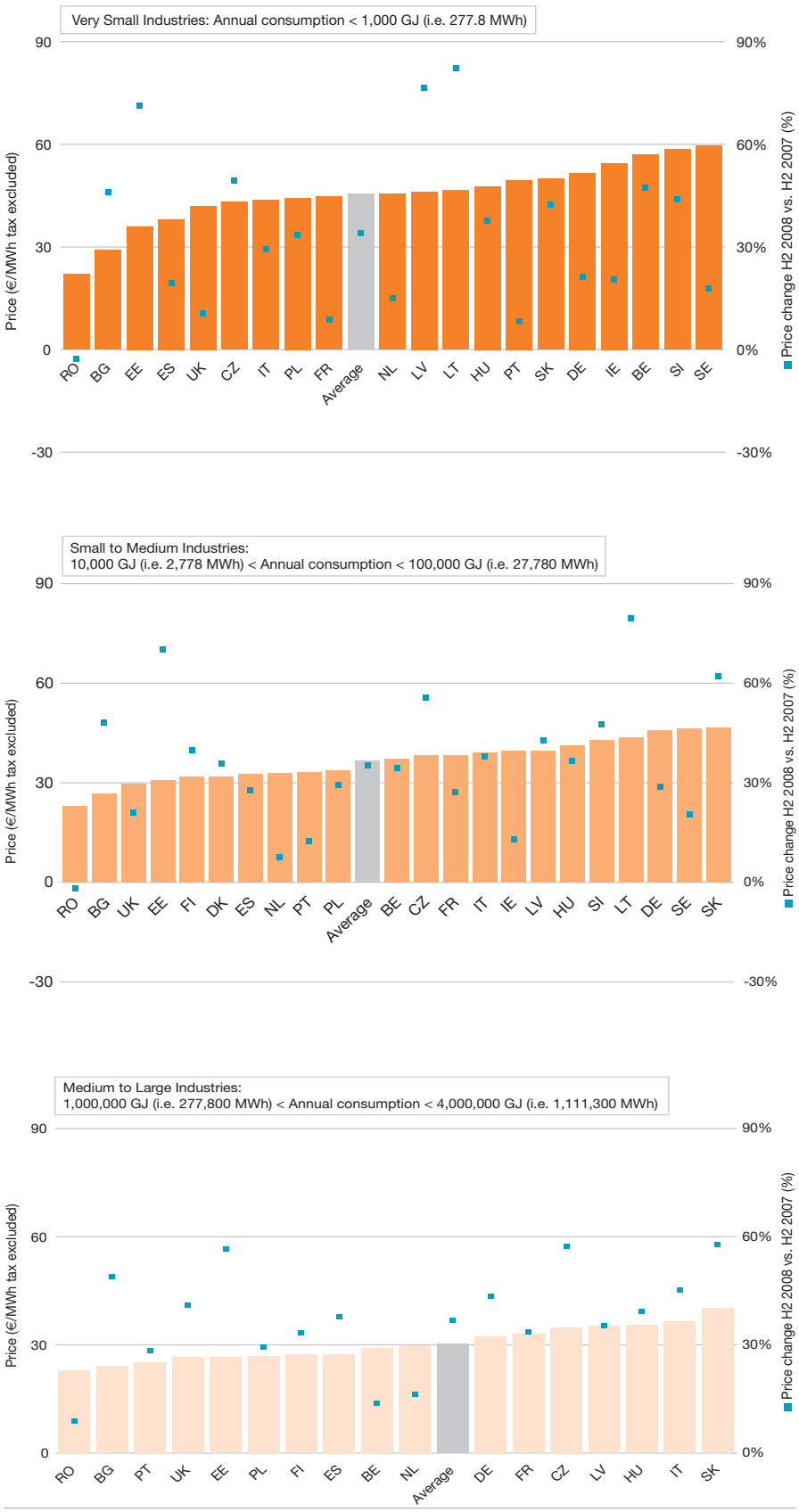
The industrial customers more affected by the prices rise are the Medium to Large companies, with an average increase for the EU-27 equal to 37%, when comparing H2 2008 with H2 2007 (see Tables 7.2). The strongest rises related to some Eastern countries (i.e. Slovakia, Czech Republic and Estonia) but also to Italy (+45%) and Germany (+44%) while Romania (+9%) is the only country showing a one-digit growth.

Small to Medium industries registered a slightly lower average price rise (+35%) as did the Very Small industries (+31%).

Residential consumers' prices registered a lower increase rate, with an average of +23% for EU-27, when comparing H2 2008 with H2 2007 (see Table 7.3). The strongest increases are reported in Latvia (+80%), Lithuania (+63%) and Czech Republic (+46%) while some countries showed a price drop, like Denmark (-20%), Portugal (-4%) and Romania (-3%). The Eastern European countries prices are progressively approaching Western European levels, since Russia is not willing to make favorable deals for those countries which have moved out from its area of influence.

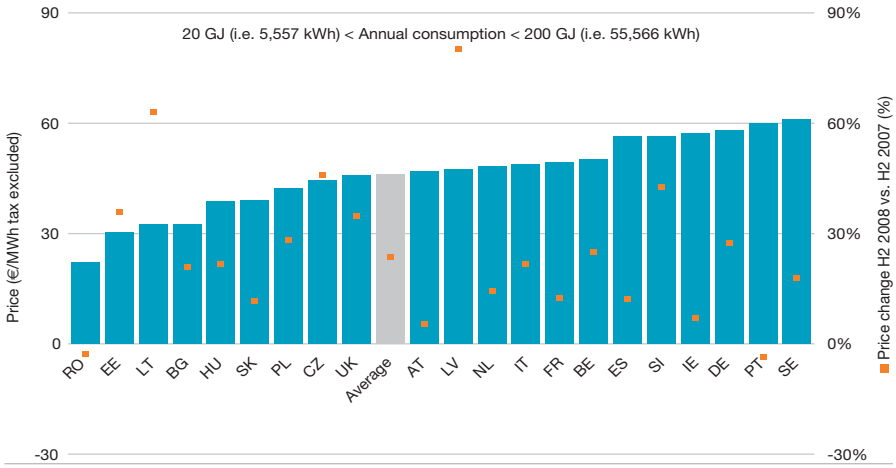
The picture for the European gas price levels is varied. Romania, one of the latest Eastern European countries to join the

Tables 7.2 I&C gas prices (H2 2008 and % change with H2 2007)



Source: Eurostat, regulators, companies annual reports – Capgemini analysis, EEMO11

Table 7.3 Residential gas prices (H2 2008 and % change with H2 2007)



Source: Eurostat, regulators, companies annual reports – Capgemini analysis, EEMO11

EU, enjoyed the lowest gas prices both for the I&C and the residential segments, with prices slightly above €20/MWh. For the other countries, the results are very different from segment to segment.

Medium to Large industries reported below average prices in the UK (€26.5/MWh) and Spain (€27.4/MWh); average prices in Germany (€32.4/MWh) and France (€32.9/MWh); and above average prices in Italy (€36.4/MWh). The average for this customer segment stands at €30.2/MWh.

Moving to Very Small industries, Italy reached the UK and Spain in the lower price band at around €40/MWh, while Germany moved to the above average section with a price close to €50/MWh. The average for this customer segment stands at €45.6/MWh.

In the residential segment, the lowest prices are enjoyed in the Eastern European countries, with Romania, Estonia, Lithuania, Bulgaria, Hungary and Slovakia all below €40/MWh. Apart from the UK, all the other major gas markets, i.e. France, Germany, Italy, the Netherlands and Spain, were in the higher European price band. The average for this customer segment stands at €46.1/MWh.

There is no such a thing as a European gas price reference as values vary significantly among the Member States. For Medium to Large industries the variation is limited as prices vary between €23/MWh in Romania and €40/MWh in Slovakia (i.e. a 75% difference). On the other side, for the residential consumers, the deviation is more relevant, with price in Romania as low as €22/MWh and price in Sweden as high as €61/MWh (i.e. a 176% difference).

Also, correlation between wholesale and retail price is not easy to find because of the transfer price policies implemented by the vertically integrated companies. Some of them tend to move the economic margins to and from the import, production or portfolio management business to the retail business. Accordingly, the retail gas price does not always reflect the level of the wholesale gas price.

Price control measures also tend to distort proper pricing of gas offers and might have negative consequences for the development of competition (see Table 7.4). Still, most of the nations maintain price control regulation, among which France, Italy and Spain have regulated tariffs and the Netherlands where NRA (the Dutch regulator) monitors price levels and intervenes in cases of excessive prices. Also Bulgaria and Romania, the countries with the lowest price levels in Europe, have regulated tariffs.

Despite the full market opening enjoyed by many countries, the switching rates for low consuming customers continued to be very moderate

The gas market is fully open in all European countries except Finland, Latvia, Lithuania and Portugal which will open in 2010. The analysis of the 2008 data, in line with the previous figures, confirms that very few countries show high annual switching rates among the mass market customers. The UK is the only country showing two-digit switching rates, followed by the Netherlands, Belgium and Sweden which are all above 5%. The other countries show smaller rates at usually below 5%. Italy, for example, despite being one of the first countries to opening its market (in 2000) showed an annual switching rate below 1%.

While the rates are higher when considering high-consuming customers, these results are highly affected by the low consuming segments, which account for the majority of the customers. These segments are the ones where the effects of the liberalization are still struggling to show up. The main reason for this is the very low margin that the retailers could expect from the sale of gas to the mass market.

A recent benchmark[18] conducted by Capgemini shows a European average gross margin per customer (gas commodity margin before the commercial costs are subtracted) close to €40 for the residential segment. This value, compared with the average Cost to Serve (€26.3/customer) and the average Cost to Acquire

Table 7.4 Status of gas price regimes (as of July 2009)

Country	Existence of regulated tariffs (date of price control removal when available)
AT	N *(2002)*
BE	N *(2003)*
BG	Y
CZ	N *(2007)*
DE	N
DK	Y
EE	Y
ES	Y
FI	No gas
FR	Y
GR	Y
HU	Y
IE	Y
IT	Y
LT	Y
LU	N *(2007)*
LV	Y
NL	Y
NO	No gas
PL	Y
PT	Y
RO	Y
SE	N *(2007)*
SI	N *(2007)*
SK	Y
UK	N

Source: CEER, Platts – Capgemini analysis, EEMO11

[18] European multi-client retail benchmark, a study on Cost to Serve (CtS) and Cost to Acquire (CtA) focusing on the households, September 2009

(€102.6/customer to be spread over the customer lifetime), explains why retailers have little interest in targeting this segment.

Gas markets are still very concentrated with the incumbents having a market share above 70% in most countries

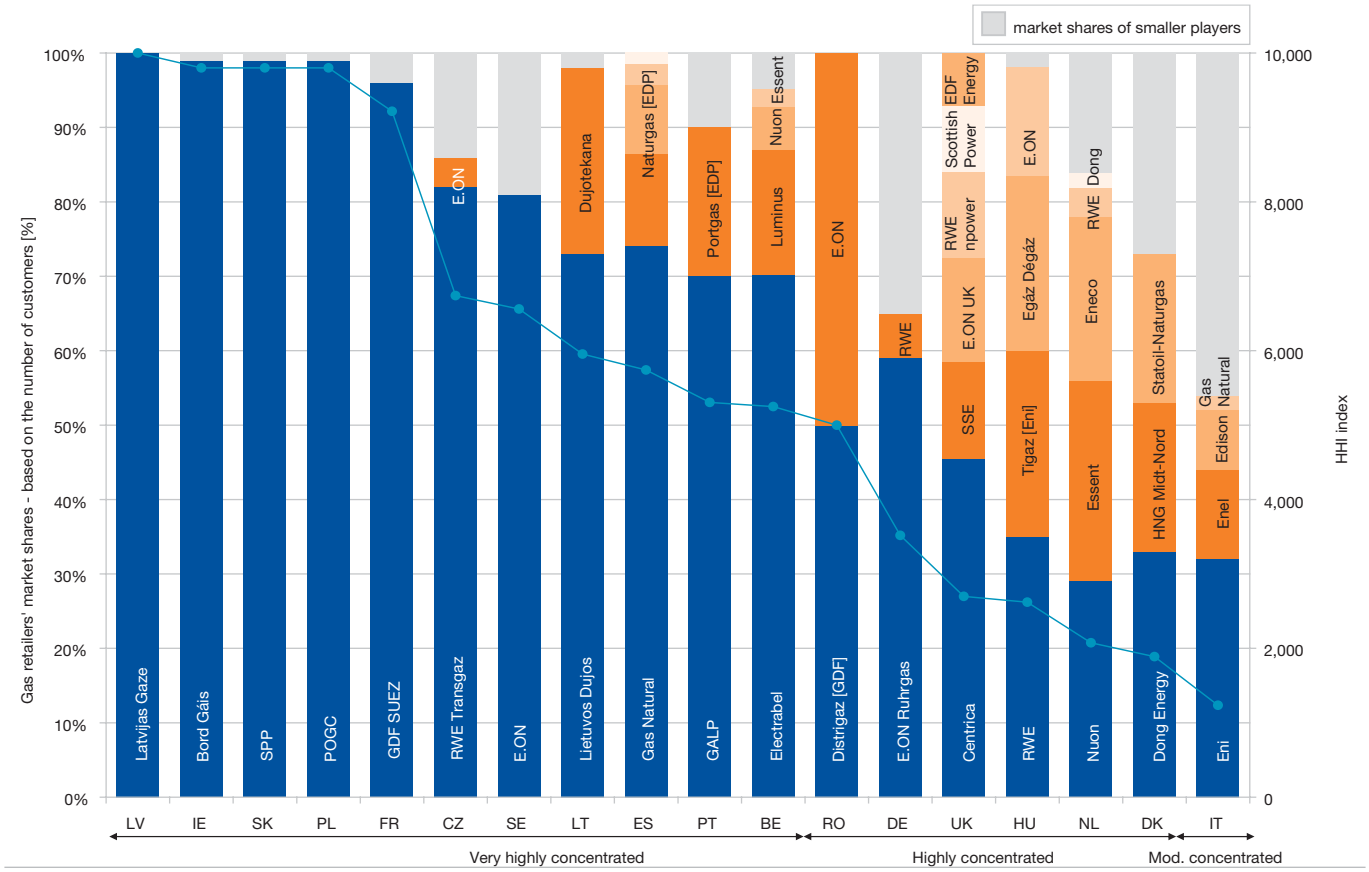
Market concentration did not show sensible changes during 2008 and the incumbents still dominated their home markets, often faced by the other (electricity) commodity incumbent (see Table 7.5). It is worth mentioning that very often market shares of operators can only still be estimated due to a lack of transparency in data publication. Therefore, any precise year-on-year comparison per retailer should be considered with caution.

We can distinguish between "very high level of concentration" (HHI > 5,000) where most of the countries fall in and "high level of concentration" (1,800 < HHI < 5,000) where all the other countries are. Only Italy appeared to enjoy a moderate level of concentration with a HHI index below 1,800. This is because the index is calculated with the number of clients and not with the volumes sold. While Eni would be at roughly 50% of the Italian market, the HHI index would be higher than 1,800, which is considered to be the threshold between moderate and high levels of market concentration.

The reason for this concentration is the difficulty faced by new players entering the market. While the lack of capacity, retained by the incumbents, has been partially overcome in many countries thanks to new regulations and infrastructure developments, new entrants still struggle to be profitable, especially in low consuming segments.

This is the result of high commercial costs that often small-sized retailers incur because they do not have the proper critical mass of clients (the Capgemini benchmark shows a noticeable scale-effect over two million customers) and low commodity margins. The latter prevents pure-players to compete with incumbents (generally vertically integrated) who can move their margin between import/production and the retailing activities through transfer price adjustments.

Table 7.5 Gas retail market concentration (2008)



Source: Companies' web site and annual reports, National Regulators – Capgemini estimation, EEMO11

Infrastructures and Regulated Activities

Electricity Transmission

Regulation remains the main driver of any structural or behavioral changes in the transmission market. Regulation will continue to drive the costs of services as well as the prioritization of certain investments and connections such as renewables. There is continued movement to more coordinated and directed investments.

Structural changes in the market – unbundling and the impact of renewables

The unbundling requirement under the Third Legislative Package led to structural changes in the networks business but the directive changed when it adopted the "third way" alongside rigorous regulation. The change allows the network assets to remain in the ownership of the vertically integrated business. A stricter regulation was also introduced including: a supervisory body (including third parties for determining the investments decisions), a compliance program and officer to prevent "discriminatory conduct" and a restriction in the movement of management labor between networks and generation business.

Ten of the 25 reported TSOs are fully unbundled whereas the others have operational separation or still need to be unbundled (see Table 8.1).

Smart meter projects: a small step for Utilities, a big step towards Smart Grid

Electrical networks were initially designed in a centralized and mono-directional way since the number of consumers increased slowly and these were all mainly settled. Now they need to evolve in order to be able to take into account the production of sustainable energy and to manage a large number of new consumers widely spread on the network, such as electric vehicles. Thus, **electrical networks of the future need to become bi-directional.**

In addition, **the distribution network will have to be able to optimize the use of electricity produced locally by renewable sources which can't be stored.** For instance, the distribution network may need to inject, at the best time in the day, the surplus of electricity produced by solar panels at local level to a neighbor consumer who might need it to recharge their electric car.

These networks will thus become intelligent (smart grids) by inserting more and more information technologies as well as telecommunications.

An "intelligent" counting system (smart metering) is the first link to a smart grid. Communicating meters allows the improvement of the global knowledge of energy consumption on the network in a real time way. It increases final consumers' awareness on their energy management (better rate structure, external terminal available for load curve visualization).

These smart metering systems involve expensive investments, currently estimated at €100 to 130 by home in CAPEX. Furthermore, these investments will necessarily have to be completed subsequently to allow smart grid infrastructure implementation. **For instance, on the distribution network, it is currently estimated that an additional investment of €360 to 400 by home will be required.** Since the sharing out of these expenses between the various actors of the value chain is not decided yet, the implementation of an entirely intelligent network will probably take more time than the home equipment in smart meters – the first steps to a smart grid.

Table 8.1 Status of ownership unbundling of electricity TSOs (as of July 2009)

Ownership Unbundling of Electricity TSOs	
YES	NO
Czech Republic (2003), Denmark (2005), Finland (2000), Italy (2003), Spain (2003), Netherlands (2002), Poland (2007), Portugal (2000), Sweden (1998), United Kingdom (1997)	Austria, Belgium, Bulgaria, Germany, Estonia, France, Greece, Hungary, Ireland, Latvia, Lithuania, Luxembourg, Romania, Slovenia, Slovakia

Source: Platts – Capgemini analysis, EEMO11

C. Lewiner (ed.), *European Energy Markets Observatory*, DOI 10.1007/978-94-007-0101-4_4,
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TSOs have been affected by the growth of renewables and are also subject to additional guidance in their investment plans

Beyond country level impacts, the Third Legislative Package has a significant impact on TSOs coordination

Under the requirements of the Package, ENTSO-E (European Network of Transmission System Operators for Electricity) was created in July 2009 and will publish its first mandatory ten year coordinated plan in 2010. ENTSO-E will coordinate investments in interconnectors for both security and economic reasons. This is bolstered by various European governments which are directing planning needs (the UK and Germany) leading to more intervention in the market. The result is that a TSO will lose its discretion to choose projects if the project is deemed to be only of national importance.

Alongside the creation of ENTSO-E, several TSOs (RTE in France and Elia in Belgium) have established a new company called Coreso (Coordination of Electricity System Operators) in December 2008. National Grid (UK) and Vattenfall (Germany) have both indicated that they were interested in joining. The main objectives of the new company are to coordinate supplies and provide forecasts relating to grid security. Coreso is hoping to develop forecasts to ease the management of electricity transit across Central Western Europe. This forecasting will allow a coordinated approach for the integration of renewables.

The TSOs have an important role in meeting the European Union (EU) environmental objectives

The need to connect renewables has a significant impact on the design and investment levels for the onshore and offshore networks businesses. TSOs are now planning to deal with greater intermittent generation that requires more sophisticated demand management techniques.

Although continued development of the network is necessary, it must be highly coordinated both within and between countries. In addition to a more government directed planning approach for onshore grid, the need for a coordinated and interconnected offshore grid is under discussion within the EU. This may become an integrated part of the ten year planning and coordination publication by ENTSO-E.

TenneT, the Dutch TSO has been asked to assess the feasibility of an offshore power grid. The intention of this is to take ownership away from many investors and give ownership and control to a central planner for the route and location of any grid. The focus on a single coordinated approach is also underpinned by the planned allocation of €165 million to a modular offshore network. The UK government will also advise on infrastructure planning and thus ease the potential planning procedure for renewables. The German government has identified a need to accelerate planning permission for coastal region cables.

Ofgem has, however, asked the EU to make a direction on the rules for connections as Ofgem feels that the industry governed change process is too slow and renewables connection is being hindered.

Key issues in Belgium

The **Smart Metering/Smart Grid initiatives are now on the top of the agenda** of every sector stakeholder with the Distribution Network Operators being at the center of the debate. The current plans are becoming public and the possible impact on the end consumer invoice has created multiple reactions. However, the mass roll-out should not start before 2014 so as to meet the European Union (EU) requirement of having 80% of the smart meters installed by 2020. The Smart Grid is considered by most of the stakeholders to be the real goal as it will improve the business case and contribute better to the well known EU 3x20 objectives.

A new study ordered by the Belgian government concluded that **Belgium should not build additional nuclear plants in the future.** However, it didn't exclude the possibility of extending the lifespan of the current plants. There is no formal position yet about the application of the 2003 planning law that will progressively close the nuclear plants starting in 2015 (with three of the seven existing reactors). The debate continues and 55% of Belgian energy is still nuclear.

The mergers and acquisition process continues in Belgium. After the Gaz de France/Suez merger and the acquisition of Distrigas by Eni in 2008, SPE Luminus (sold to Centrica by Gaz de France in 2008) has been taken over by EDF as a compensation for Centrica becoming a shareholder of the EDF British nuclear operations.

Does this mean that France is getting control of the Belgian energy market? This is a topic that the European Commission (EC), the Belgian government and sector authorities are considering carefully.

In addition to these major transactions, other processes are continuing such as the production capacity swap between Electrabel and E.ON; Essent joining RWE to address the Benelux market; and other initiatives from new entrants or smaller players to gain market share.

With future renewables and network investment coordination needs, Statnett (Norwegian TSO) has requested that NVE (the Norwegian Water and Energy Directorate) stop issuing new connections for wind and small hydro even though the impact of this could delay 100 MW of connection by five years.

National Grid (UK's TSO) has also indicated a need for an additional UK£9 million requirement to improve its capability to manage fluctuating flows that could lead to increases in "Short Term Operating Reserve Requirements" and associated costs.

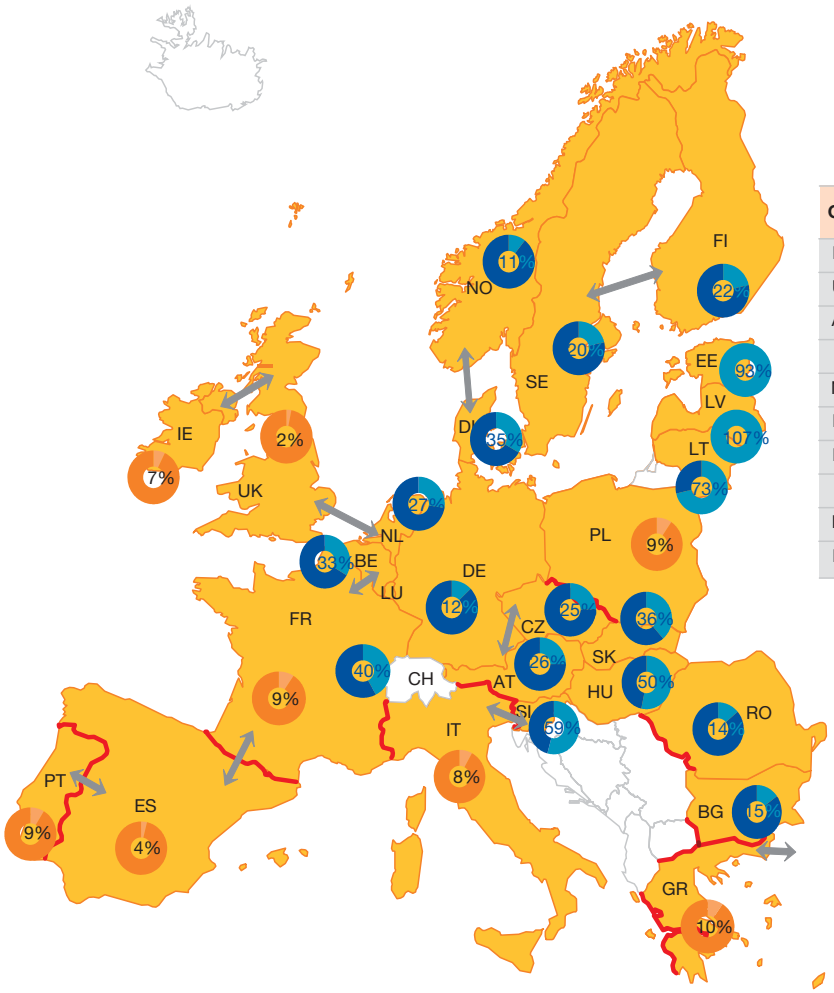
Additional environmental costs are also related to the need of underground networks. The costs of an underground line assessed for the Austrian regulator indicated that besides technical factors the costs would be multiplied by a factor of 6.2 relative to overhead lines. Objections, like those that led to a 20-year delay of the Austria's Burgenland to Stria line (380kV/ €230 million), can damage the efficiency of power management. This delay affected the balance of wind/hydro and thermal power.

Cross country interconnections continue to make markets more dynamic

Security and congestion management continue to be improved through interconnection and active congestion management

The need for security of supply to be supported through market mechanisms and therefore interconnectors to allow arbitrage is central to Europe's integrated market. The threshold of a minimum of 10% interconnection level (defined as the import capacity divided by the total generation capacity of a country) is achieved by 18 of the 26 systems (see Table 8.2).

Table 8.2 Map of interconnections levels, bottlenecks and priority interconnections (2008)



Countries	Projects of interconnections	Expected date	Capacity increase
ES-PT	Aldeadávila – Lagoaça 400kV	2009	>1,000 MW
UK-NL	BritNed HVDC link	2010	>1,000 MW
AT-HU	Tie-line Wien SO – HU Border	2010	n.a.
FI-SE	Fennoscan submarine cable	2011	550 MW
NO-DK	Skagerrak 4 submarine cable	2012	600 MW
LU-BE	Bascharage – Aubange 220 kV	2012	n.a.
PL-DE	Krajnik – Vierraden 400 kV	2013	n.a.
SI-IT	Italy with Slovenia 380kV	2013	500 MW
HU-SK	Sajóivánka – Moldava 400kV	2014	n.a.
FR-ES	France with Spain 400 kV HT	2014	n.a.

Source: ENTSO-E, European Commission – Capgemini analysis, EEMO11

In 2008, six projects were reported as complete. These included:

- The new N. Santa (Greece) – Babaeski (Turkey) 400-kV-line;
- The capacity increase of the existing 220-kV Padriciano (Italy) – Divaca (Slovenia) line;
- The new HVDC link between Norway (Feda) and the Netherlands (Eemshaven);
- The capacity increase of the existing Bekescsaba (Hungary) – Nadab (Romania) 400- kV line;
- The new 400-kV-line between Stip (Macedonia) – C. Mogila (Bulgaria);
- The capacity increase of the existing Slavetice (Czech Republic) – Durnrohr (Austria) tie-line.

Where the threshold has not been achieved several projects are either under construction or are seeking planning permission. There is considerable activity to build interconnectors with 62 projects named by UCTE that are at various stages of development (see Table 8.3). Imera Power (an asset investment company based in Ireland) has several proposed interconnectors between Ireland and the UK as well as between the UK and France with further interconnection between the UK and Belgium also possible. Two interconnectors between Portugal and Spain are currently under construction. Italy has seven projects currently being reviewed. Overtime as planned interconnectors will be built, the level of congestion will be reduced and security levels will be increased.

Under the Regional Electricity initiative (REI) the Central West Area (which includes Belgium, Germany, Netherlands, France and Luxembourg) is now considering the options for continuous trading or implicit auctions as they attempt to move towards a single European market.

Market coupling also continues with the introduction of:

- The Czech and Slovak day ahead markets from September 1, 2009;
- Elia (Belgium) and TenneT (the Netherlands) intraday allocation of

Table 8.3 Projects of electricity interconnections (2008)

Stage	Total	Congestion driven	Consumer driven	Market coupling	Security driven	Power exchange capacity
Complete	6	3	-	1	1	1
Planned	9	2	-	4	1	2
Under-construction	7	5	-	1	-	1
Permitting	2	1	1	-	-	-
Design & permitting	11	8	-	-	2	1
Under consideration	27	4	-	5	5	13

Source: ENTSO-E – Capgemini analysis, EEMO11

Key issues in Spain

The recent negative economic environment resulted in **a strong fall in both power and gas demand** especially **during the first half of 2009.**

Power demand decreased by 7.2% in H1 2009 compared to H1 2008, mainly due to the smaller industrial consumption, with some specific sectors showing a decrease of up to 20%. Gas demand followed a sharper trend, with a decrease of 14.8% during the same period, adding the effect of reduced industrial consumption plus minor CCGT production.

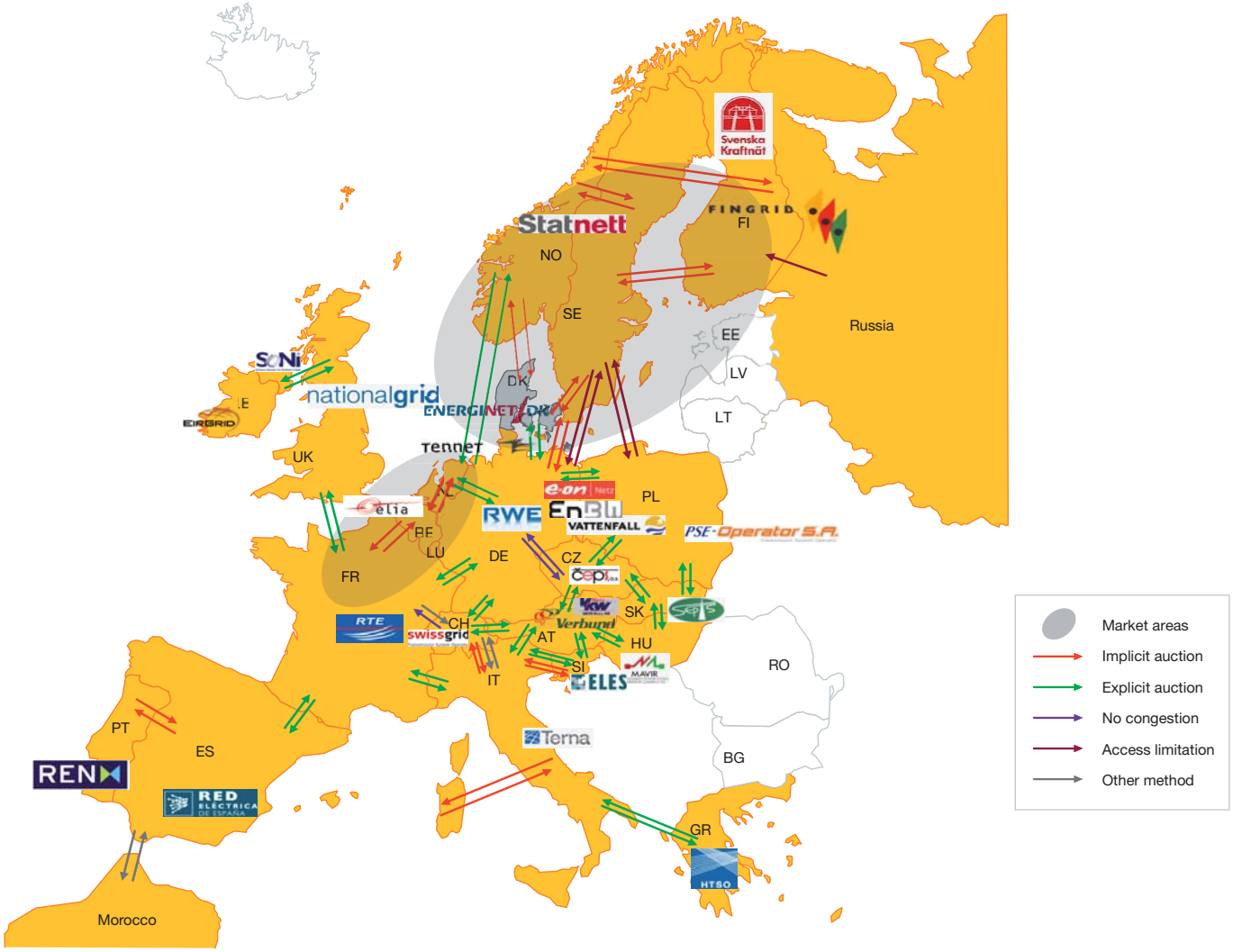
Commodity demand and prices decreases worldwide also resulted in a decrease of power and gas prices in the Spanish market which introduced **a stronger competition between fossil producing technologies (coal versus gas) in the power market, as well as forcing Utility companies to better optimize their coal and gas portfolio and capacity assets (constrained by take or pay contracts).** Iberdrola has recently sold its stake in BBG and Saggas LNG terminals to the global alternative investments business of Deutsche Bank.

In the retail market, **progress was made in the market liberalization during 2009 with the disappearance of the regulated tariffs** in gas and electricity, and the generalization of "last-chance" tariff for customers who had chosen to stay in the regulated market. This transition to a liberalized market had a minor effect in terms of switching, since most of the regulated tariffs households were migrated directly to this last chance tariff.

In relation to corporate transactions, the EU authorized Enel **to increase its stake in Endesa of up to 92%** through the acquisition of the 25% stake owned by Acciona (a Spanish infrastructure management, services and renewable energy company). As part of this agreement **Acciona was granted Endesa's renewable assets**, thereby allowing Acciona to become **a leading company in green power generation** in Spain and in Europe. **Gas Natural** completed during 2009 the acquisition of **Union Fenosa** to create a power and gas integrated big player **among the top ten energy companies across Europe.**

Iberdrola Renewables will take actively part of the development of renewable energies in the US, having been awarded a great proportion of the Stimulus program subsidies.

Table 8.4 Map of electricity TSOs and congestion methods (2008)



Source: ENTSO-E – Capgemini analysis, EEMO11

transmission capacity – auctioned on an annual or monthly basis;

- Progress in the coupling of Germany and Denmark has stopped due to technical problems. The intention is to re-launch it in Q3 2009.

There has been no change in the forms of congestion management used (see Table 8.4) but auctions between Spain and Portugal, and between Italy and Sardinia have become implicit.

Regulation continues to drive up TSOs' CAPEX but OPEX is also expected to fall

Regulators continue to incentivize appropriate and efficient investments. Investments in CAPEX doubled over the last five years, reaching a new high of €5.7 billion in 2008, a 17% increase on 2007 (see Table 8.5).

Even those countries that spend the least in absolute terms have also undergone significant ramp-ups. In Germany, Italy and Netherlands the ramp up has continued in 2008 which may reflect the initial investment increase happening a year later than other TSOs which have a stable or falling investment profile. The main drivers of investment remain replacing ageing assets, the resolution of continued congestion and the increased readiness for the connection of renewables.

Investment as a proportion of total revenue has increased for six of the reported TSOs.

Significant investments continued even during the current economic downturn:

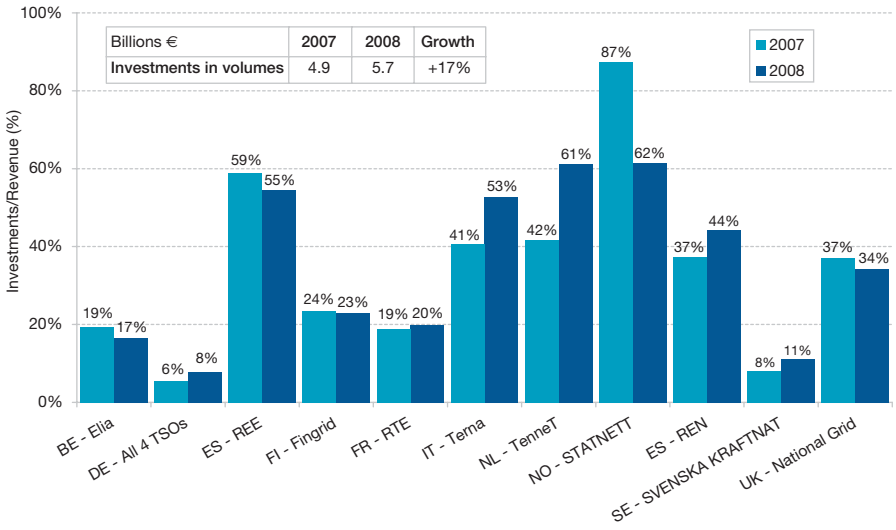
- Bundesnetzagentur (the German regulator) announced allowances of €8.6 billion for 2007 to 2009, with €6.2 billion being invested by the four German TSOs;
- The Irish networks business continues to invest in the renewal and expansion of its system with an additional €4 billion (in addition to the €6 billion invested since 2001) being earmarked by Eirgrid to deliver its projected renewables and demand needs by 2025, doubling the country's grid capacity to 15 GW. However, this was before the current reforecast (July 2009) that the 2008 demand levels would not return until 2012 to 2014.

RPI-X remains the main regulatory tool employed across Europe. Ofgem is reviewing whether RPI-X remains appropriate and capable of meeting the challenges facing the electricity industry.

- Some regulatory changes include AEEG (Italian regulator) which allows increasing returns of 6.9% compared to 6.7% until 2011, whereas the German regulator has given a higher return to new assets;
- Other incentive based regulation is being used to manage congestion and balancing. The UK TSO continues to earn high returns from its reward structure and the Italian regulator has approved an additional 2 to 3% return.

As companies go through several price reviews, meeting the challenge of the 'X' factor and reducing the OPEX becomes more difficult. But shareholders, consumers and regulators continue to demand it as it is based on effective cost benchmarking.

Table 8.5 Electricity TSOs investments in the national grid as a % of their revenues (2008)



Note: 2008 data for German TSOs is based on planned investments and may vary.

Source: TSOs Annual Reports, National Regulators – Capgemini analysis, EEMO11

Key issues in Norway

A new connection between Norway and the Netherlands was put into commercial operation in May 2008 with the objective of exporting electricity to continental Europe. The full capacity was used during the daytime, with a total export of 3.3 TWh in 2008 and an import of 0.3 TWh, mostly during night time.

E.ON AG and Statkraft completed an asset swap deal worth €5 billion. This gave Statkraft access to assets in Sweden, the UK and Germany.

Utilities continue to explore renewables other than hydro. In 2008, Statkraft and Agder Energi created a joint venture for onshore wind generation.

The Norwegian Water Resources and Energy Directorate (NVE) presented their first consultation paper regarding the rollout of smart meters in 2008. The consultation proposed **full implementation of smart meters by the end of 2013.** However, after strong influence from the industry, NVE released **a second consultation in 2009 which changed the date to January 2015** and specified the technical descriptions.

In September 2008, the Norwegian government put a new reversion law into effect. The law ensures that **public bodies will own at least two thirds of every generation plant** in Norway. The legislation is valid for generation plants of 27 MW or more.

The **new shared balancing system** for all Nordic countries will be implemented in Norway by 2009. The objective is to have **a similar structure as the Nordpool Spot.** A shared role model and similar handling of meter data and settlement will ensure a harmonized and no discriminating fee structure.

Key issues in Italy

In 2008, **security of supply, competition and cost reduction** were the main issues of the national energy industry.

The Adriatic LNG terminal has gone on-stream, but what about the others?

In October 2008 a new LNG terminal has been installed offshore at Porto Levante, in the northern Adriatic Sea. The new gas infrastructure, controlled by Qatar Petroleum, ExxonMobil and Edison, adds 8 bcm/year of import capacity to the Italian system.

While the Adriatic plant has come on-stream, many others are on hold. The players expect a surplus of gas import capacity and seem more interested in the nuclear initiatives sponsored by the government. Accordingly, they may direct their investments away from LNG terminals.

Greater retail profits have taken the switching rate to double-digit figures

New provisions by the Italian energy authority allow the retailers to make greater profits from the sales of electricity to the mass market.

This segment has been historically unattractive but the recent increase of the economic margins (€30 per customer per year) has prompted the incumbents and other retailers to sharpen their marketing and acquire new customers. This has resulted for 2009 in a jump in the cumulated churn rate, from 2.5 to 5.8% for the residential customers, and to 25% for the Soho (Small office home office) consumers.

Snam Rete Gas has become a vertically integrated company in the regulated gas business

In the first half of 2009, Snam Rete Gas, the gas TSO, has incorporated Stogit, the greatest storage system operator, and Italgas Rete, the greatest distribution network operator, to become one of the largest gas infrastructure player in Europe with an asset base valued at €20 billion. The operation, however, is more a financial move for Eni, which can receive a share premium as a pure upstream operator, than a cost cutting measure.

Current market economics are changing the behavior and finance of the TSOs leading to changes in their business strategies

TSOs have reacted to changes in the market and the regulatory environment differently

National Grid disposed of €2.7 billon of its wireless business in the UK and Australian Basslink interconnector for €530 million so as to focus on its core networks businesses in the US and UK.

E.ON, however, is preparing to sell its high voltage (220kV and 380kV) network (Transpower Stromubertragung) by November 2010 as part of its deal with the EU anti-trust authorities, and Vattenfall Europe is expected to do the same.

Terna raised €1.1 billion to fund its investment program and also realized cash (€809 million) from selling 66% of its Brazilian network.

ENTSO-E continues to highlight the need to manage the mismatch in the licensing timetable between the lead time for the building of new generation plants and the need to commission new grid equipment.

This mismatch and the additional competing signals to power projects investors (energy prices, renewables policy, ETS) leads to increased uncertainty and may require a “guiding mind” when planning the build of a network that is secure, robust, economic and flexible.

Electricity Distribution

Functional unbundling is the expected model of distribution businesses but there is a perception that there may not be true operational independence

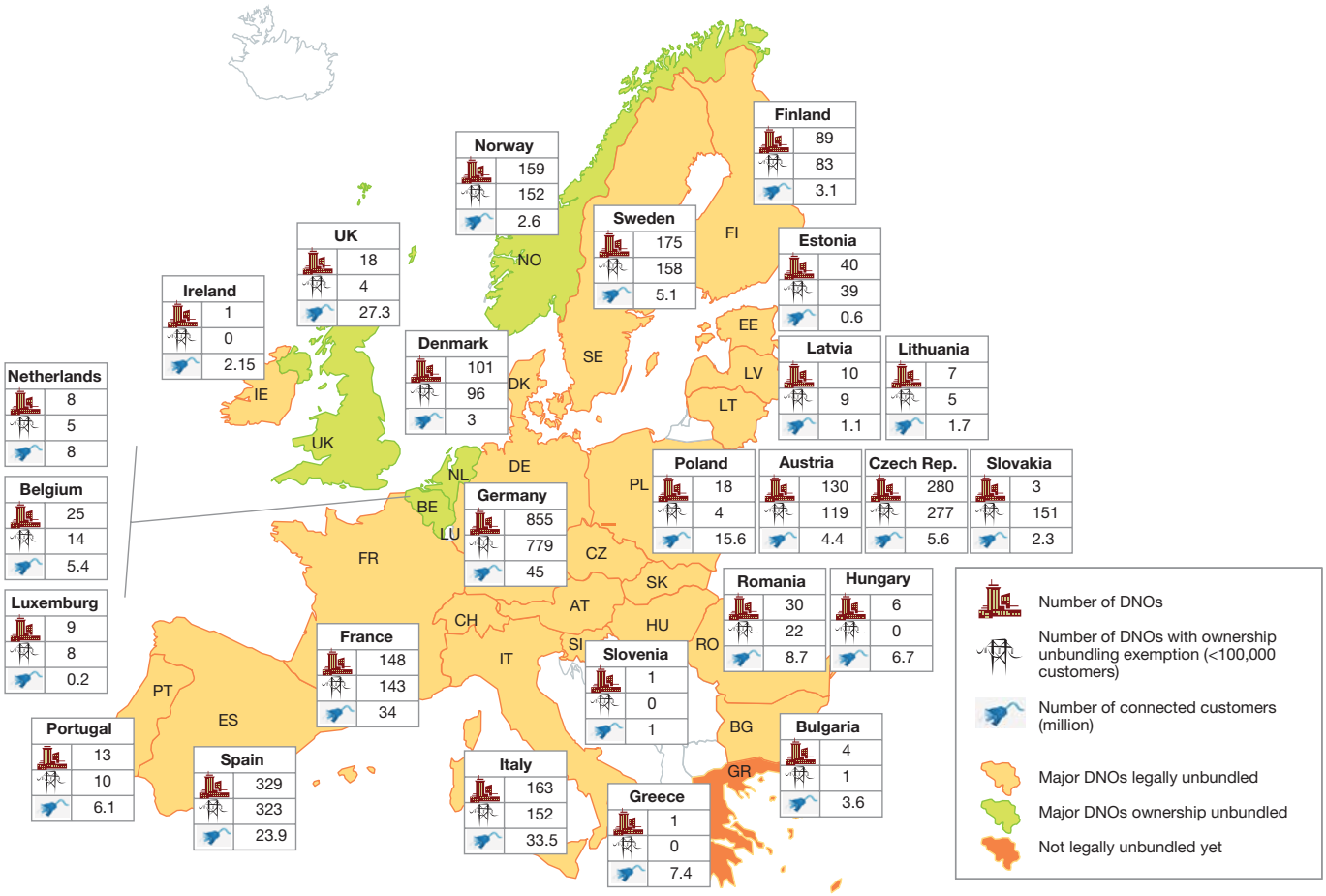
Functional unbundling of distribution businesses became compulsory in all Member States as of July 1, 2007. However, many distribution network operators (DNOs) have so far been slow to implement this unbundling completely. The Third Legislative Package does not force ownership unbundling but provides rules to secure their independence.

Nevertheless, for the vertically integrated Utilities which have created subsidiaries for their distribution business, there is a perception of continued interference on the competition side with retail businesses and the lack of an independent culture which is evidenced by the use of the same brand logos. According to ERGEG, DNOs have not yet fully embraced their role as "market facilitators" for retail markets.

The lack of separation (at a functional level) is also due to Member States making extensive use of the EU derogation allowing DNOs which have less than 100,000 customers to be exempted from legal unbundling (see Table 9.1). This derogation is allowed because at this scale unbundling can lead to significant economic losses, as the size of a fully unbundled efficient DNO has been estimated by Capgemini to require approximately three million customers[19].

However, a few countries are moving towards ownership unbundling. In the Netherlands the legislation on Independent Network Operators enforces

Table 9.1 Map of electricity DNOs (2008)



Source: National Regulators – Capgemini analysis, EEMO11

[19] Distribution Networks Comparative Performance Benchmarking, Capgemini, March 2008

Incentive quality based regulation for DNOs is becoming popular

The quality of the services provided by the electricity network operators remains one of the counterparts for the payment of network tariffs. For this reason, **implementing an incentive for economic performance, such as income or price caps, is inseparable from a control of technical performances.**

Most European countries now have set an operational incentive scheme for electricity quality of supply at the distribution level. Only a few have such regulation in transmission. The incentives schemes have two dimensions:

- "Guaranteed Standards" to protect the consumers with a minimal acceptable level of quality;
- Incentive on network operators' revenues to control the average service quality level with financial rewards or penalties according to a target.

Incentive quality based regulation schemes in Europe

	Date of implementation	Incentive ceiling and floor	Quality indicators used in Distribution incentive schemes
UK	2001	• +/- 3% total income	• Customer minutes lost • Customer interruptions
Italy	2000	• + €6/customer (rewards) - €4.5/customer (penalty)	• Net SAIDI • Net SAIFI+MAIF
Norway	2002	• No ceiling and floor	• Energy not supplied including short interruption in 2009
Netherlands	2004	• +/-5% income / year symmetric	• SAIDI (interruptions > 5 seconds)
Portugal	2003	• +/- €5 m income symmetric	• Energy not supplied
Spain	2008	• +/- 3% allowed income symmetric	• TIEPI • NIEPI
Sweden	2003	• No direct incentive but affects results of the performance assessment model	• SAIDI • SAIFI
France	2009	• +/- 1% income / year symmetric	• SAIDI

Source: Benchmark on quality of supply regulation for electricity DNOs, Capgemini, April 2008

Capgemini has conducted a benchmark throughout Europe on the quality of supply regulation in 2008. The main findings are the following:

- Countries with significant incentive signals have experienced an improvement in quality of supply or stability levels (e.g. SAIDI was divided by three since 2000 in Italy);
- Italy, the UK and Norway were the first countries to implement such incentives. They also have acquired experience which allows innovations;
- France and Spain are on the way to implement such systems;
- Financial incentives are used to adjust the allowed revenues of the network operators in most cases;
- To set the target regulators use mainly "long interruptions" duration (> three minutes) and "frequency". Some initiatives also include the use of short interruptions (e.g. in Italy in 2009);
- Three methodology measures can limit the financial exposure:
  - Limiting the financial incentive by fixing ceilings and floors (generally between 1 and 5% of the turnover);
  - Often a case by case process to exclude exceptional events where network operators must justify each case;
  - Allowances to compensate for costs due to unusual climatic events (UK), or hedging fund (as in Italy).

ownership unbundling for DNOs by January 2011. The acquisition of unregulated activities from the two main Dutch Utilities by foreign operators has expedited this process: RWE acquired Essent separating the distribution grid into a new company called Enexis; and Vattenfall acquired Nuon's grid, separating the distribution business into a new company called Alliander.

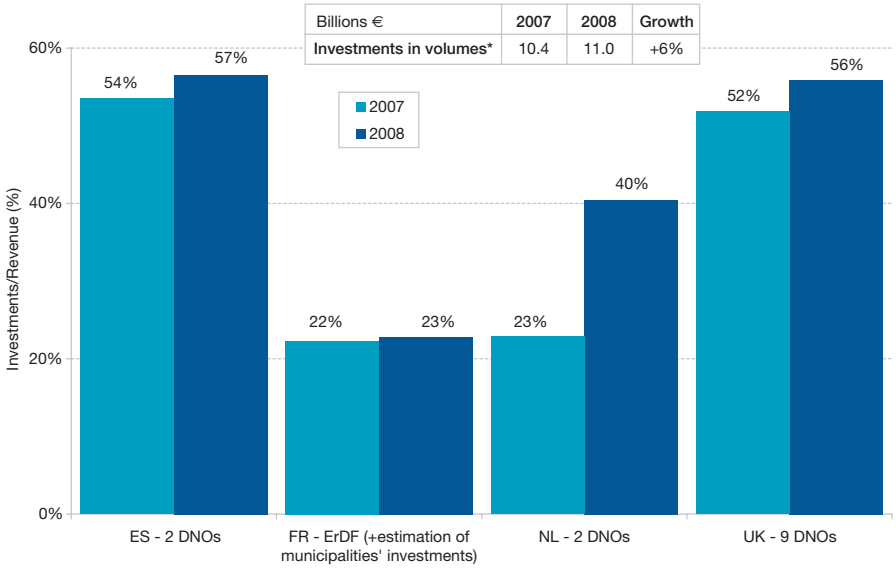
As a result of this unbundling process, four different DNOs' business models now exist:

- Full ownership unbundling;
- "Heavy" legal unbundling: DNOs hold all responsibilities (or can buy services through competitive tendering);
- "Light" legal unbundling: some operations such as planning or billing are separated, but maintenance and network operations remain with the parent company;
- Accounting unbundling for DNOs of less than 100,000 customers.

To promote stronger independence, ERGEG published guidelines for good practices in mid 2008 which were in line with the Third Legislative Package with the main focus being on:

- Non discriminatory access to networks and information on network-related issues;
- Full managerial independence of network operators;

Table 9.2 Electricity DNOs investments as a % of their revenues (2008)



*Note: *For the same perimeter as shown in the chart, plus all German DNOs and Italian Enel Distribuzione*

Source: Companies' annual reports – Capgemini analysis, EEMO11

- Avoidance of commercial interests in the market and conflict of interest.

These "universal" standards are now used by regulators to assess their national DNOs' compliance with unbundling.

A greater level of investment has become a major objective for distribution activities

DNOs have been under increasing pressure to accelerate their capital expenditures (CAPEX) which has actually increased, at a European level by 6% between 2007 and 2008 (see Table 9.2).

The need to invest in the electricity distribution network is estimated to be close to €700 billion in Europe and Eurasia for the next 20 years according to IEA's World Energy Outlook 2008 (worldwide estimates for transmission and distribution are US$6.8 trillion over the same period).

The main drivers for increasing the levels of CAPEX include:

- Ageing distribution assets as many European assets were built in the 1960s and are approaching the end of their lives;
- The need to accommodate the expanding renewable electricity sources and micro-generation. This requires significant improvement and expansion of the distribution grids to allow effective management and connectivity of these new power sources;
- Implementation of smart grids;
- Installation of smart metering on the basis of the European Commission (EC) regulation recommendations;
- Greater customer expectations on quality requiring reinforcement of security and quality of supply.

Illustration of this trend is the large investment programs started in 2008 by EDP Distribuição de Energia in Portugal, ESB network in Ireland and ERDF in France.

However, the economic crisis could temporarily hamper the pace of the investment needed in the next year

The recent drop in electricity consumption could induce significant revenue gaps for Utilities as the revenues from the distribution use of system charges generally depends on contractual load and actual consumption. This drop in revenue could act as an incentive to reduce investments in new projects and could be exacerbated by the view that the allowed regulated return is considered insufficient to cover their actual cost of capital in many countries.

Large investment programs are leading to tariff increases which, given the current context, may not be acceptable and, therefore, lead to delayed investments.

However, the full effect of this could be weakened as DNOs do benefit from the low cost of long-term bonds; stable credit

ratings; and they have regulation mechanisms to recover capital expenditure in the medium-term, as long as it is approved by the regulator.

The economic crisis may however impact DNOs differently. Vertically integrated Utilities are currently carrying large levels of debt and could be willing to divest from their distribution assets to finance more strategic profitable businesses. An example is EDF's potential asset sale of its UK distribution subsidiary to fund its acquisition of British Energy. Similarly, in Germany, E.ON plans to sell Thüga and Vattenfall plans to sell Wemag.

An increased activity in mergers and acquisitions is also expected for the distribution segment. It may allow some Utilities to reassess their incomes and risk portfolio (regulated versus competitive income streams), resize distribution activities in order to find their efficient scale, find a strategic balance of regional positioning, or comply with regulation pressure for network independency.

More incentive mechanisms and more investments are the major trends underway for electricity DNOs' regulation in Europe

Massive CAPEX programs tend to lead to distribution tariff increases. It will happen despite the productivity improvement targets set by the regulators on DNOs' OPEX.

In 2008, performance based regulation kept developing throughout Europe and through the different regulated activities (see Table 9.3):

- Implementation of various CAPEX incentives;
- Most countries have set up an incentive for quality of supply regulation;
- More and more countries are adopting an incentive for network losses optimization (e.g. Spain, France in 2008/2009).

In order that the DNOs maintain their CAPEX program, regulators and governments (through their economic

What kind of regulation will reduce electrical networks losses?

Directive 2003/54/EC obliges network operators to procure the energy they use to cover their network losses on the market. **Finding adequate incentives for the TSOs and distribution DNOs to reduce electrical network losses should contribute to increase energy efficiency in the electricity supply, reduce greenhouse gas emissions, and keep watch over the costs for the procurement of the losses when included in the network tariffs.**

Many regulatory authorities in Europe have started to introduce incentive mechanisms to reduce power losses in the transmission or distribution networks and in H2 2008, ERGEG, the European Regulators' Group for Electricity and Gas, held a public consultation[a] to collect comments from stakeholders.

Different distribution system operators have asked Capgemini to help analyze their own market mechanisms for the treatment of losses in order to prepare negotiations with the regulators. The study covered a precise description of core components and focused on the calculation methodologies used to estimate the power losses.

Since losses may not be measured on distribution networks, they are indeed, for a given settlement period, estimated ex post from a global energy balance. Different calculation methodologies have led to similar concerns about an accurate distribution among technical losses (loss of energy stemming from the dissipation of heat in electrical networks) and various categories such as unmetered consumption, thefts or settlement errors.

It might not be easy for DNOs to leverage the reduction of their network losses in the short term. Technical losses are influenced by appropriate and heavy investments in the networks. **Only the implementation of smart metering may allow a more continuous and detailed metering process, and therefore efficient action plans.**

a) E08-ENM-04-03 & 03c - Treatment of Electricity Losses by Network Operators - ERGEG Position Paper

stimulus plans), are trying to find a way towards "smarter" regulation, based on a better dialogue with the network operators and more innovative incentives:

- In Germany, Incentive Regulation Ordinance was applied in January 2009. By using benchmarks, efficiency targets were set for each DNO. In parallel, the regulator has set an incentive on CAPEX (higher rate of return for new assets than for the existing grid);
- In the UK, the preparation of distribution price control regulation number five focused on:
  - More coordination between the different incentive schemes;
  - A better balance between the protection of the consumer and the future development and financial viability of operators;
  - A better optimization of investments.
- In France, a new network tariff has been applied since August 2009. It includes a new incentive regulation scheme on quality of supply, service quality, and network losses. The tariff is built on the basis of a 2% increase;
- In its 2008-2011 price control, the Italian regulator has introduced mechanisms that provide a better rate of return for certain types of investment which are crucial for the development and the efficiency of distribution grid infrastructures but with the provision of implementing appropriate efficiency indicators.

Table 9.3 Electricity distribution regulatory regime (2008)

	Dominant method for network tariff setting	Dominant method for target setting	Incentive on quality of supply included	Incentive on network losses included
Austria	Price cap	National Benchmark	To be implemented in 2010	
Belgium	Cost plus in 2008 Revenue cap from 2009	National Benchmark		
Denmark	Revenue cap	National Benchmark	To be gradually integrated from 2009	
Finland	Revenue cap	National Benchmark	X	X
France	Cost plus in 2008 Performance based incentive from 2009	Cost audit	From 2009	From 2009
Germany	Revenue cap	National Benchmark	Expected in next regulatory period	
Ireland	Revenue cap	Cost submission, Benchmark	X	X
Italy	Price cap	Cost audit, including need for quality improvement	X	
Netherlands	Yardstick / Price cap	National Benchmark	X	
Norway	Yardstick / Revenue cap	National benchmark	X	X
Portugal	Price cap	Internal grid cost analysis	X	
Spain	Price cap	Reference network model	X	X
Sweden	Revenue cap	Reference network model		X
UK	Yardstick / Revenue cap	National Benchmark	X	X

Source: ERGEG, National regulatory reports to ERGEG – Capgemini analysis, EEMO11

Key issues in The Netherlands

The impact of **full ownership unbundling** is visible throughout the market. Competition is increasing and switching is now greater than 10% and heading towards 15%, and the Cost to Serve and Cost to Acquire are key drivers for the retail Utilities profitability.

There are **numerous new players in the retail business fighting for market share**, including large companies like E.ON, Electrabel, Dong and Vattenfall. There are others which are doing **aggressive marketing campaigns that offer free products, free kWh and even money refunds to attract new customers** such as Oxxio, Energie:Direct, and the "Nederlandse Energiemaatschappij". Incumbents like Essent, Eneco and Nuon are struggling to increase their retention rate and diminish churn. Increased transparency through price comparison websites and marketing campaigns is stimulating switching.

The Dutch incumbents proved to be popular targets for big European Utilities. Acquisitions of Essent by RWE and of Nuon by Vattenfall are shaping the market. Eneco chose to focus on small scale sustainable generation and decentralization and took over parts of Econcern. However, this proud green energy business with an outlook to become a multibillion company by 2010, collapsed due to the economic crisis.

Distribution companies like Enexis (formerly Essent) and Alliander (formerly Nuon) **are operating as standalone organizations** and are focusing on asset management, smart grids and disentanglement in preparation for full unbundling. They are supporting the initiatives of the municipalities to initiate sustainable and small scale local energy generation facilities. Stimulated by CO_2 reduction and ownership decentralization, new energy companies are being created to generate and sell energy on a local scale.

The new market model, requiring the optimization of market processes and the reassignment of responsibilities, is under tension. The first chamber did not ratify part of the legislation, due to privacy issues with smart meters. This will probably result in further delays (until 2012 or 2013) in both the rollout of smart meters and the implementation of the new market model.

Gas Transmission

Ownership unbundling is not the only industry issue

In the institutional debate over gas transmission ownership unbundling, the French and German positions prevailed.

Transmission undertakings should ensure independency but can remain in the ownership perimeter of the vertically integrated companies (see Table 10.1). This is why in 2008 the market did not register any split of transmission assets.

Table 10.1 Status of ownership unbundling of gas TSOs (as of July 2009)

Ownership Unbundling of Gas TSOs	
YES	**NO**
Denmark (2004), Netherlands (2005), Spain (2003), United Kingdom (1997)	Austria, Belgium, Bulgaria, Czech Republic, Germany, Estonia, Finland, France, Greece, Hungary, Ireland, Italy, Lithuania, Latvia, Luxembourg, Poland, Portugal, Romania, Sweden Slovenia, Slovakia

Source: Platts – Capgemini analysis, EEMO11

Third Legislative Package: A Three Set Match? C|M|S| Bureau Francis Lefebvre

The main contributions of the five pieces of legislation in the EU Third Legislative Package are not necessarily the very media oriented issues of the anti-Gazprom clause or the independence of Transmission System Operators (TSOs).

Certainly, the two directives devote lengthy expositions to the three options (unbundling; independent system operator, or "ISO"; independent transport operator, or "ITO"), with particular emphasis on the latter. The ITO scheme is unattractive because of its clumsiness, cost (minimization of resource pooling, prohibition against recourse to the same service providers as the vertically integrated undertaking), and structural complexity (triangle of TSO – vertically integrated undertaking – regulator).

But what is important for building an integrated European market probably is elsewhere. In particular, **the creation of "ENTSOs" for electricity and gas should be singled out.** The harmonization of standards, management instruments and network codes, as well as ten-year plans, should enable better coordination of investments, greater transparency, better management of congestions and more effective steering of crisis situations.

Likewise, **it is essential to reinforce the independence and skills alignment of national regulators based on the most high-powered models** (investigative powers, binding decisions and fines), **covering wholesale and retail markets, as well as networks and interconnections.** Similarly for **the creation of the Agency for the Cooperation of Energy Regulators** which is dedicated to technical regulations and regional cooperation between TSOs and between regulators (with some power to arbitrate between regulators), and the strengthening of consumer rights (clearly understandable contracts, clear invoices, prices or tariffs, rapid and cost-free switching, fast dispute resolution).

Otherwise, **the European legislation seems stable and coherent** (single market, secure gas supply, combating climate change). **Henceforth, all effort should focus on implementation, and not on negotiation of a Fourth Legislative Package.**

The settlement of the debate is the result of a fair acknowledgment of the peculiarities of the European gas market. The majority of gas is supplied from countries outside Europe that are often not willing to sign supply contracts without the evidence, on the side of the client, of the availability of enough transmission capacity.

Also, the major question of the industry is less about the control of the suppliers over transmission assets and more about the asymmetry of the downstream part of the industry, fragmented in Europe, and the upstream part, which is very much concentrated.

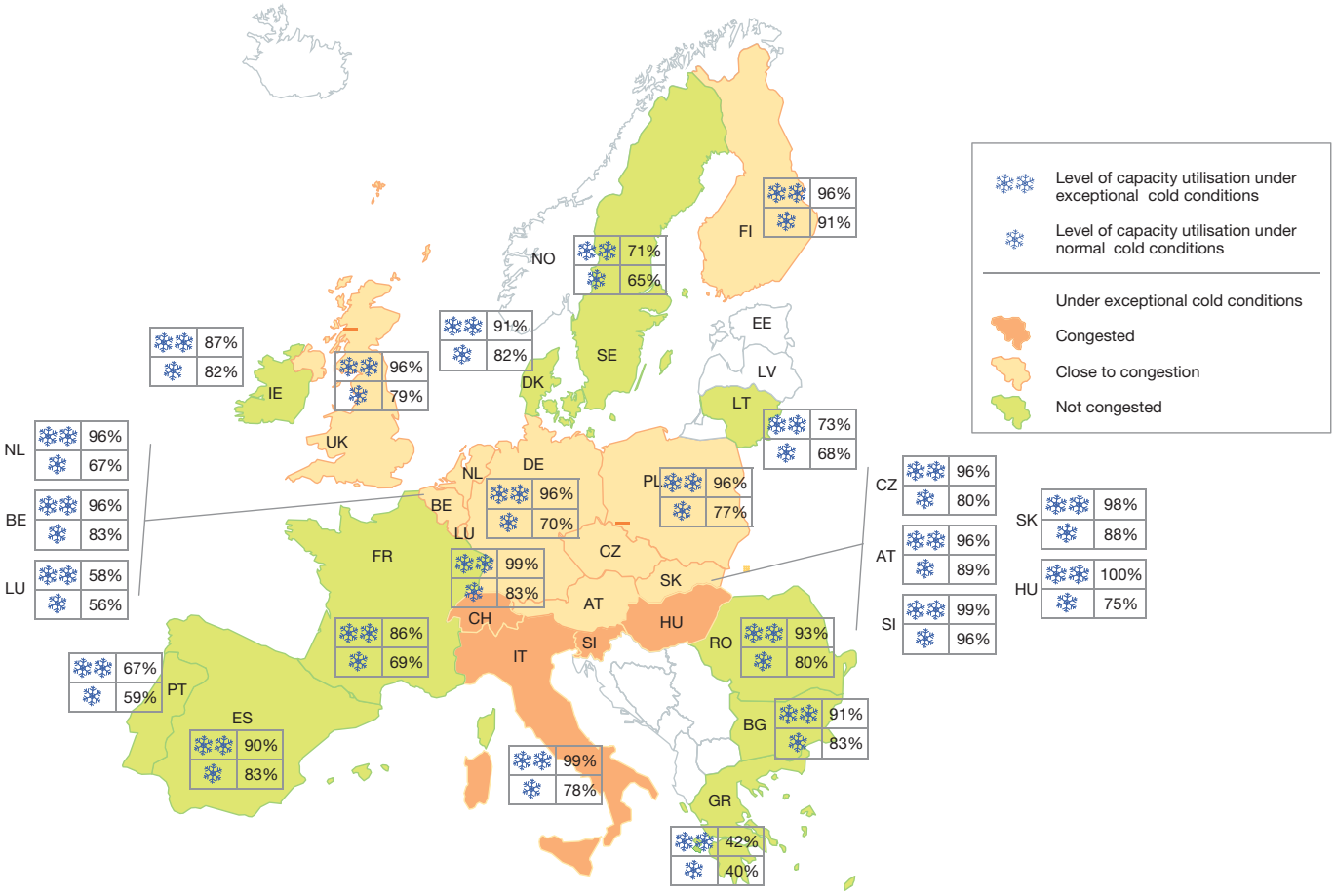
There are no physical congestions under normal cold conditions but there are under exceptional cold conditions

The European picture of capacity utilization under normal winter conditions does not present any relevant congestion situation (see Table 10.2). All major gas markets have a utilization rate below 85% and hence display an adequate amount of overcapacity.

Also, the limited deviation from the maximum and the minimum utilization rate among the main gas countries (the UK, Germany, Italy, France, Spain and the Netherlands) is a clear result of some gas flow optimization and re-distribution occurring within market areas.

The situation deteriorates, however, when severe cold conditions hold. In this case, some of the countries experience congestions, as is the case of Slovakia (98%), Italy (99%), Hungary (100%) and Slovenia (99%). When the utilization rate approaches 100% all sourcing facilities work at maximum capacity and supply may be disrupted. For this reason, congestion management measures are often mandatory and provided for by the regulation as is the case of Slovenia. This is where congestion management mechanisms have been integrated into the rules regulating the gas transmission business.

Table 10.2 Map of physical congestions on gas infrastructures (2008)

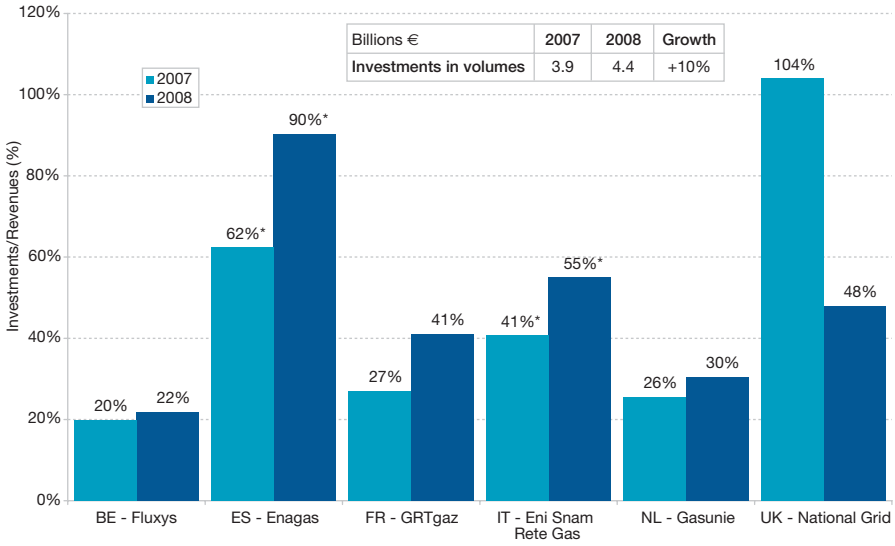


Source: GIE gte – Capgemini analysis, EEMO11

The capacity considered above is not only the import capacity, i.e. the interconnection capacity, but also includes the contribution of LNG, production and storage capacities of any country. Even so, it gives a good idea of the level of congestion at the interconnection.

Also, the capacity refers to technical and not commercial capacity. An interconnection point may be congested even when there is enough physical space, if a supplier hoards commercial capacity to exclude the competitors from accessing it. This is the case of the Netherlands, where we can observe commercial congestions for the import capacity of H-gas (high calorific value gas), and as in the case of Belgium with Fluxys being pressed by the regulator CREG for not having implemented a proper contractual congestion management policy.

Table 10.3 Gas TSOs investments in the national grid as a % of their revenues (2008)



** Investments given for pipelines, LNG and storage activities*

Source: Companies' annual reports – Capgemini analysis, EEMO11

Congestions affect primarily the interconnection points. In the countries where the gas market is divided in zones, some internal congestion may occur as well. In France, for example, the demand from shippers during the allocation session of marketable transmission capacity from the GRTgaz North zone to the South zone, which closed on January 15, 2008, was several times the volume on offer.

Capacity is planned to increase and the TSOs' investments are not much affected by the economic crisis

The physical congestions that may happen during exceptional cold situations and the contractual congestions have prompted the TSOs, or the regulators to press the TSOs, to extend the capacity at the interconnections between countries and market zones.

As reported by the European gas TSOs association (GTE), the major developments are expected to take place at the border with the Netherlands, and more precisely:

- At Bunde-Oude Statenzijl cross border point, where H-gas enters into the Netherlands from Germany; the capacity is planned to increase from 32 mcm/d in 2009 to 90 mcm/d in 2018,
- At Zelzate, where the Dutch GTS network interconnects with the Belgian Fluxys system; the capacity is expected to reach 25 mcm/d in the Dutch side and 29 mcm/d on the Belgian side, by 2018.

And capacity at many other European interconnection points is likely to increase.

The GTE publication of the capacity increase plan goes in favor of greater market transparency, a key condition for the developments of the gas transmission market.

The capacity extension activities are reflected in the investment plans of the major TSOs. All European TSOs have budgeted developments for several hundreds million euros. Snam Rete Gas, the Italian TSO, has announced in its 2009 strategy plan to invest €4.3 billion during 2009-2012 (corresponding to an average of more than €1 billion per year), directed largely to the developments of the internal system. Spanish Enagas and British National Grid are following, with CAPEX in 2008 of €777 million and €445 million respectively.

When compared to the yearly revenues, TSOs investments display a positive trend (see Table 10.3). The projects do not seem to be delayed, let alone halted, by the economic crisis and there are several reasons behind this behavior.

First, the profitability of the capacity developments is generally set by the regulators most of the time regardless of gas volume dynamics. In Germany, for example, TSOs make money from the sale of transmission capacity with no relation to the actual amounts of energy transported. If they sell less capacity than expected they can recover the losses by increasing the capacity fees of the following year. Once the plans are approved by the regulators, which tend to favor high degrees of overcapacity, their profitability is somehow guaranteed.

Second, those investments have been decided within the context of a long-term strategy. Indeed, they can take some years to be completed. The current slump is then unlikely to affect the TSOs CAPEX plans.

Of course, 2010 plans from the TSOs will confirm whether these business rationales still hold. If plans are revised downward then TSOs will probably have reviewed gas demand expectations and hence capacity requirements.

The financial activities of TSOs are not limited to system developments but extend into market consolidation. E.ON Gastransport and Bayernets have merged their H-gas assets into one single company: NetConnect Germany. Again in Germany, Gasunie, Ontras-Vng Gastransport, Wingas, Statoil and Dong Pipelines have combined their networks to establish a new market area controlled by the company Gaspool. Snam Rete Gas in Italy has bought the assets of Stogit, the major Storage System Operator (SSO), and Italgas Rete, the major Distribution Network Operator (DNO), resulting in one of the largest gas infrastructure company in Europe with assets valued at €20 billion.

Cost cutting is not always the driving logic behind market consolidation. The combination of gas market areas in Germany is a provision of the regulation whereas the operation of Snam Rete Gas is more of a financial move for Eni, which controls it but would like to spin it off soon, as the market now recognizes higher Earnings Per Share (EPS) to pure upstream companies.

Regulation, and not the market, drives the profitability of the gas transmission business

As mentioned above, the profitability of internal system developments depends more on the gas transmission regulation than on the gas market trends.

The logic behind the gas transmission profitability is similar all over Europe and depends primarily on the allowed cost of capital set by the national regulatory authorities.

The allowed cost of capital, instead, varies among the European countries (see Table 10.4). It is high in France (7.25%, real pre-tax) and low in the Netherlands (5.5%, real pre-tax). Also, France, Italy, and the Netherlands regulations provide an incentive to new investments in the form of a premium to the base allowed cost of capital.

The GTE ENTSO-G initiative is proceeding

Regulators direct the evolution of the gas transmission activity but TSOs come together to plan the future of the business.

During 2008, GTE continued its efforts towards the creation of ENTSO-G, as envisaged by the Third Legislative Package. ENTSO-G (European Network of Transmission System Operators of Gas) is the representative body of European gas TSOs.

For this purpose a new work group named GTE+ was established in February 2008 with the appointment of dedicated staff. The objectives for GTE+ are two-fold: to establish the basis for ENTSO-G; and to demonstrate some progress towards a better functioning market in the pre-Third Legislative Package environment.

GTE+ also launched a consultation process concerning the opportunity of establishing ENTSO-G at the beginning of 2010, ahead of the schedule foreseen in the Third Legislative Package (ENTSO-G can be formally created only eight months after the creation of the Agency for Cooperation of Energy Regulators, another regulatory body that should be established according to the Third Legislative Package). The creation of an "unofficial" ENTSO-G could be appropriate in order to start trialing Third Legislative Package processes and rules as soon as possible, even before the formal establishment of the Agency.

Table 10.4 Cost of capital for gas TSOs (2008)

Country	Base cost of capital*	Premium cost of capital*
France	7.25%	3.0%
Germany	7.01%**	0.0%
Italy	6.70%	3.0%
Netherlands	5.50%	1.5%
UK	6.25%	0.0%

**Real pre-tax; **Estimated by Capgemini with an inflation rate of 2.2%*

Source: National Regulators – Capgemini analysis, EEMO11

Key issues in France

The retail switching rate started to increase in 2008 thanks to the law on reversibility. Switching rates for Q2 2009 (compared to Q1 2009) have increased by 15% and 18%, for gas and electricity respectively. Just over one million household sites have chosen a new electricity provider which allows the regulator to speak about an "emerging market".

The "Champsaur Commission" has made some recommendations about the market organization while trying to conciliate competition and nuclear profits redistribution. The main recommendations are:

- End regulated tariffs for industrial customers by 2015;
- Prolong regulated tariffs for households under conditions which should allow competition;
- Introduce a regulated wholesale tariff between producers and the electricity retailers.

The French government is aiming to translate these recommendations into law by the end of 2009, but this will require the solving of the practical details.

In September 2009, **France committed to reform its power market and introduce more competition** to close two EC legal cases.

Construction of wholesale markets has continued with the launch of the gas stock exchange by Powernext and the merger of the electricity exchange with German EEX.

Generation capacities have developed: 4 to 5 GW new capacity constructions have been undertaken and 14 to 15 GW new capacity have been approved which are mainly nuclear, gas power plant and far behind, renewables:

- A second EPR construction has been decided in partnership with EDF and GDF SUEZ at Penly (Normandy);
- 2008 has also been a good year for renewable energy development with 950 MW new wind capacity and 105 MWc new PV capacity.

After months of political wrangling, **a carbon tax** for fuel and transport **will be introduced from 2010**, at a price of €17/t.

Gas Storage

The growing European dependency on gas imports highlighted by the Russia-Ukraine crisis shows once again the necessity to develop storage

While public and media attention tend to focus mainly on pipeline developments and LNG terminals projects, investments in storage facilities appears to be as important. Indeed, natural gas storage is an essential part of the gas value chain helping to meet seasonal load variations and providing security of supply against unanticipated disruptions.

The cold weather conditions during the winter 2008/2009 and the Russia-Ukraine gas dispute in January 2009 highlighted the critical role played by storage. Europe's storage operators have delivered significant volumes of gas stocks as the main mitigation measure to this crisis. According to Gas Storage Europe (GSE), European commercial gas stocks were drawn down by 15% during the first half of January 2009.

Table 11.1 Map of gas storage (2008)

Source: GIE gse, BP statistical review of world energy 2009 – Capgemini analysis, EEMO11

At the beginning of the crisis storage facilities were, fortunately, ready to deliver a considerable amount of gas since the lower consumption from the industrial sector in the context of the economic downturn had offset the increase in gas demand for heating, due to quite low temperatures.

While EU-27 becomes more dependent on gas imports, which are less flexible, compared to indigenous production, the need for gas storage capacity in the EU is set to grow quite significantly over the coming years. Furthermore, the situation is uneven across Europe, with some countries, mainly South Eastern European countries, lacking sufficient storage capacity. Therefore, investment in storage facilities is now a priority for governments as well as for gas companies.

Indeed, storage remains a strategic activity for large actors and attracts new ones. The top three players in the gas storage market are:

- Eni with 150 TWh of actual commercial capacity (and 41 TWh currently in project);
- E.ON with 110 TWh and 80 TWh in project;
- Storengy (GDF SUEZ) with 105 TWh and 27 TWh in project.

Except in Germany and in Spain, where there is still a large number of regional players, most of the storage companies are national champions in terms of market shares, and most companies operate mainly on their domestic markets. Some of the companies which operate in several countries are Wingas, Storengy (GDF SUEZ), E.ON and RWE.

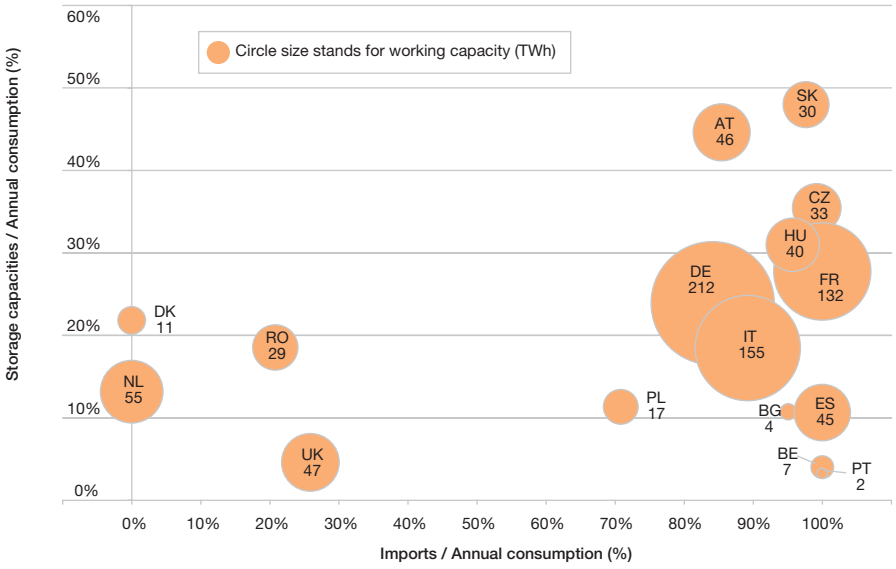
Future storage projects should change this market structure since new operators are involved in projects especially in the UK (i.e. Canataxx, EDF Trading) and consolidation might also happen.

Thanks to the investments of the past years, storage capacity in Europe continued to increase

There is currently 863 TWh (see Table 11.1) of storage capacity operating in Europe (up by 5% compared to 2008, and up by 15% compared to 2005). This capacity is split between depleted gas fields (two third of the capacity) and aquifer or salt cavity (one third of the capacity). Of the approximately 110 facilities in Europe, 45 have less than 2 TWh of capacity.

As a whole, gas storage capacity represented 17% of EU-27 annual demand in 2008 (versus 16% in 2007). As shown on Table 11.2, storage capacities represent around or above 20% of their annual consumption for some countries like Germany with 212 TWh, Italy with 155 TWh, or France with 132 TWh. Together these three countries represent around 60% of the EU-27 storage capacity. Added to facilities in the Netherlands, the

Table 11.2 Gas storage capacities (2008)



Source: GIE gse, BP statistical review of world energy 2009 – Capgemini analysis, EEMO11

UK, Austria and Spain, 80% of storage capacity are located in only seven countries. However, geological potential differs between countries: France and Italy hold depleted gas fields; Latvia has a high potential too but has a limited need; and other countries like Belgium have no additional potential.

The main evolutions between 2007 and 2008 occurred in the UK, Germany, and Austria:

- **The UK** increased its storage capacity by 8% thanks to an extension of Rough (now 32.4 TWh) and can now store 5% of its annual demand. The UK became a net gas importer in 2005 so it needs to rely more on gas storage;
- **Germany'** gas storage capacity increased by 7% in 2008, mainly thanks to the extension of Bierwang (15.6 TWh) and Uelsen (8.1 TWh) and can now store 18% of its annual demand;
- **Austria** has a capacity of 46 TWh, which increased by 5% thanks to an extension of Schönkirchen / Reyersdorf (now 18.1 TWh) and Tallesbrunn (now 4.3 TWh). Austria can store 45% of its annual demand.

The increasing number of projects for new facilities or extensions illustrates the growing interest for gas storage even though the economic downturn created difficulties for some projects

According to a study from the EC[20] on past events at a country level, a 1% increase in household gas consumption on average is related to a 0.82% increase in storage capacity, while a 1% increase in indigenous production generates a 0.3% decrease in storage capacity. The development of these market parameters is, therefore, key in the evolution of supply and demand for storage capacity in the future.

As of February 2009, the European Gas Storage Association (GSE) listed more than one hundred projects, representing 702.9 TWh of additional storage capacity (+11% versus 2007). With a growth trend of 4.5%, as observed over the past years, the European gas storage capacity should reach approximately 1,300 TWh by 2020 (see Table 11.3).

Most of these development projects are located in depleted fields. And once again, most are located in countries that already have above average storage capacity such as Germany, Italy or France.

- **In Germany**, 24 projects are listed. In 2008 a new project of 10.8 TWh in Bierwang was announced by E.ON. The main projects under construction are Epe EGS H-Gas (2.9 TWh) and Etzel (2.7 TWh) by E.ON and Epe (3.4 TWh) by RWE Essent Energie. The main planned projects are Etzel EGS with 27 TWh (E.ON) and Jemgum with 13 TWh (Wingas);
- **In Italy**, 14 projects are listed. A new project was announced in 2008 by ERG Rivara Storage (Rivara, 32.4 TWh). The main projects under construction are Bordolano with 16.2 TWh (Eni Group), and Cellino & Collato with 6 TWh (Edison Stoccaggio);
- **France** holds eight projects of which four are currently under construction.

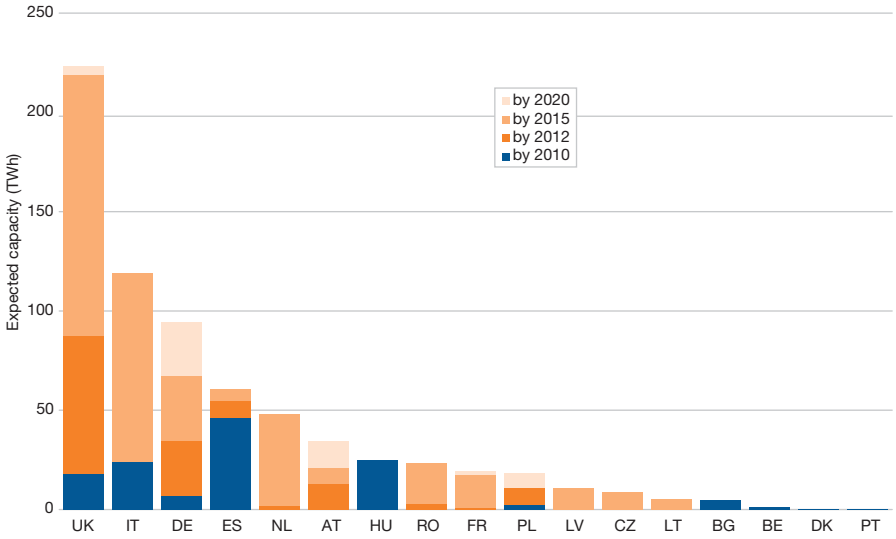
But there are also significant additions in Spain with 15 projects listed. In the UK, 20 projects are listed such as a new project announced by Centrica (Baird, 18 TWh). To stimulate the investment, the UK government is developing a new regulatory regime for offshore gas storage. The main projects under construction in the UK are Aldbrough with 4.5 TWh (SSE/StatoilHydro) which should start commercial operations in 2009, Stublach with 4.5 TWh (Storengy), and Holform with 1.8 TWh (E.ON). In addition there are planned project at Esmond/Gordon (Star Energy) with 44.3 TWh, Fleewood with 13 TWh (Canatxx), Gateway with 12.3 TWh (Stag Energy), and Portland with 10.8 TWh (Portland gas).

Additionally, in the **Netherlands**, a project for extension (+10 TWh) was announced in 2008 by Taqa for Bergermeer, and in **Hungary**, a project for extension (+7.5 TWh) was announced by MOL for Szoereg-1.

Due to the economic crisis, some projects that were expected to be operational by 2010 may slip to 2011 or 2012. In the UK, for example, the projects at Esmond/Gordon and Portland have been hit by financial problems which are generating delays. Additionally, some projects were cancelled in 2008 in Germany and Belgium. Financing difficulties and demand uncertainties may impact or delay other large projects.

[20] Study on natural gas storage in the EU, European Commission, November 2008

Table 11.3 Gas storage facilities projects (2008)



Source: GIE gse – Capgemini analysis, EEMO11

With storage levels information becoming available, the gas storage market becomes more transparent, but solidarity between the countries still needs to be organized

The GSE which handles around 86% of the total EU technical storage capacity provides a weekly aggregated inventory of gas in storage facilities across Europe and envisages increasing the frequency from weekly to daily.

According to this database during H1 2009 natural gas inventories were filling up at a rapid pace across Europe as production continued to grow and demand remained weak. It remained below average for this time of the year, but situations were different depending on countries. In Germany, for instance, storage was below average in H1 2009, but should rise in H2 since oil-indexed price for long-term contracts are forecasted to fall. In the UK, on the other hand, storage levels were quite high in H1 which was the same in Belgium, Italy and Spain.

The first regular Energy Council gave ministers further opportunity to mull over the gas dispute between Russia and Ukraine. The EC proposal, now being revised after the January 2009 gas crisis, could move even further in terms of solidarity. The EC has proposed establishing a center for monitoring the drawing of gas from underground storage facilities. The EC brought a certain support to Ukraine in order to guarantee the filling of these storage before the winter and thus reduce risks stemming from a new Russian gas supply curtailment.

Key issues in Slovakia

Slovakia is strengthening its position as a leader in the nuclear energy sector in the Central & Eastern Europe region.

There was **a very turbulent time for the Slovak energy market** in Q4 2008 and Q1 of 2009. After a dispute between Russia and Ukraine that disrupted European gas supplies at the beginning of year 2009, Slovakia announced that it would restart a nuclear reactor which had been shut down in accordance with its EU accession treaty. The decision was not welcomed by Austria which urged the EC to take action.

The Slovak government argued that the decommissioned 440 MW unit at Bohunice would resume production in order to maintain stability of the country's electricity grid. Bratislava had declared a state of emergency after the flow of Russian gas had stopped. Fortunately, the SPP (Slovak Gas Company) supported by its shareholders (Ruhrgas and Gaz de France) found another solution to pump the gas in the reverse direction from the Czech Republic. This crisis had a strong negative impact on the Slovak economy and opened up again the issue of the security of energy supply in the EU.

In July 2009, **Slovenske Elektrarne, the main electricity generation company in Slovakia, and part of the Enel Group, signed main contracts for the completion of the construction of the third and fourth blocks of NPP Mochovce.** Among leading suppliers are Škoda JS, Atomstrojexport, Enel Ingegneria & Innovazione and others. The total amount of contracts is worth of €2.775 billion and the completion date is expected for 2012 and 2013 respectively.

Also **some important legal amendments have been approved to push the Renewable Energy Sources (RES)** in Slovakia. In Q2 2009, the Slovak government approved **a new bill to support the RES which gives to the investors the insurance to sell their energy at feed in tariffs for a period of 15 years.**

Gas Distribution

Gas DNOs have complied with the European Directive on unbundling but some still remain part of vertically integrated Utilities

In the gas sector, legal unbundling became compulsory in all Member States as of July 1, 2007. The Third Legislative Package does not require ownership unbundling for DNOs, but the process through legal unbundling must guarantee independence of the network operators.

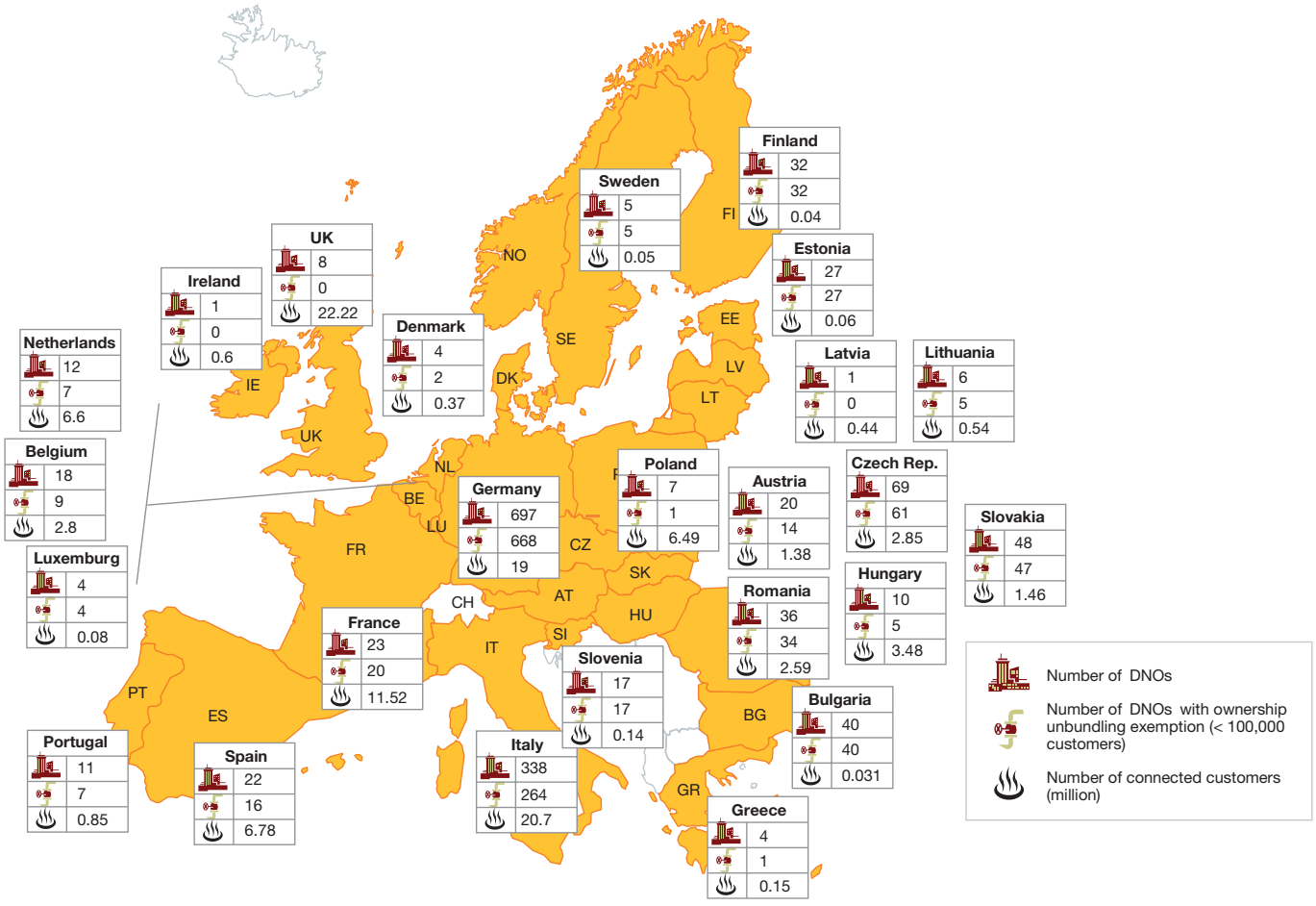
The nine countries which had not unbundled their DNOs in 2007 did so in 2008, including France and Ireland. Member States kept on using extensively derogations from unbundling at distribution level: more than half of the Member States allowed DNOs with less than 100,000 customers to be exempted from legal unbundling requirements at the end of 2008 (see Table 12.1).

Most legally unbundled gas DNOs remains part of the vertically integrated Utility which has raised concerns about the level playing field for connections and service provision. This lack of independence is perceived to interfere on the competition side with the retail businesses.

In 2008, regulators asked for a greater level of investment

The seven major gas DNOs actually

Table 12.1 Map of gas DNOs (2008)



Source: European Commission, Eurogas – Capgemini analysis, EEMO11

increased their CAPEX by 15% in 2008 (see Table 12.2).

In a recent European gas DNOs benchmark[21], Capgemini found that CAPEX requirements are structured according to the specific characteristics of the distribution operator. Two distinct groups can be identified:

- A development-driven model, for DNOs which have low gas penetration leading to a network extension program to meet the desired scale (e.g. Spain & Portugal);
- A replacement-driven model, for DNOs which have high gas penetration, but require network renewal for ageing, unsafe, obsolete networks and higher standards (e.g. UK replacement gray cat iron to polyethylene and old networks in Germany).

In 2008, UK's Ofgem allowed investment of €7.5 billion over the regulatory period 2008-2013. This increase focused on asset replacement with a 36% increase in the allowance compared to the last review. GRDF, the French DNO sustained its investment levels over the regulatory period 2008-2012 focusing on network improvement.

The current economic crisis brought additional constraints on gas DNOs' investments. CAPEX will be only maintained if the regulatory incentives are appropriate

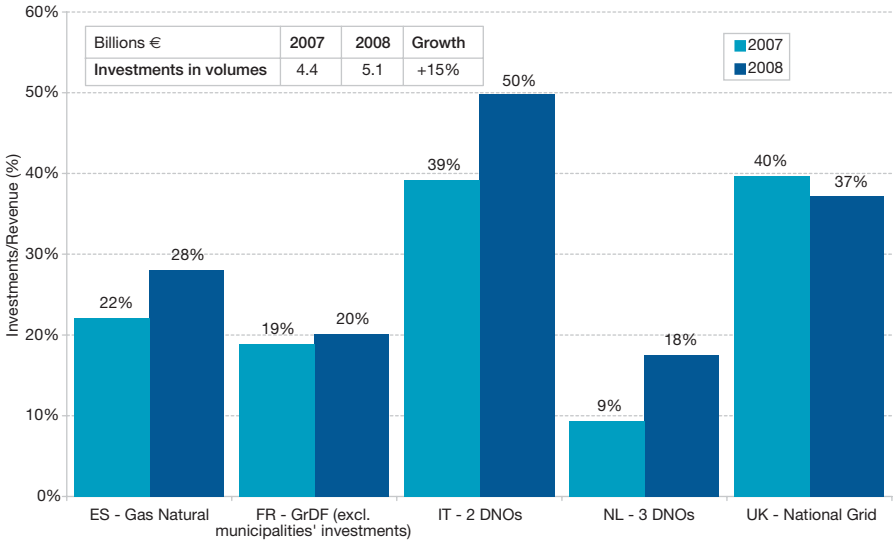
The drop in gas consumption was even greater than in electricity. This drop will have a large impact on investments:

- Assets could be stranded or under-utilized making them less profitable as the revenues (linked to consumption patterns) begin to fall and are insufficient to cover the high level of fixed costs;
- The combination of lower consumption and higher capital cost may lead to the postponement of certain projects that are no longer financially viable;
- Continued investments will need to be recovered through higher tariffs which are currently unacceptable. However, this downward trend should be short lived compared to the lifetime of the distribution assets and investments should continue, if approved by the regulator.

Potentially the economic crisis and regulatory environment both for unbundling and revenue recovery may lead to more mergers and acquisitions in gas distribution, as the Utilities find the right strategic balances between activities and regional positioning, and secure the risk and levels of return through regulation. Some major mergers and acquisitions activity includes:

- GDF SUEZ acquiring the City of Rome natural gas distribution network operated by Eni's subsidiary Italgas. It has also taken control of Italcogim (distribution network covering 245 Italian municipalities), as part of the Distrigas deal;

Table 12.2 Gas DNOs investments as a % of their revenues (2008)



Source: Companies' annual reports – Capgemini analysis, EEMO11

[21] European Gas Distribution Networks Performance Benchmarking, Capgemini, February 2009

- ENEL sold 80% of its distribution network activity to Eni's subsidiary Snam Rete Gas, representing 11% of the Italian domestic gas distribution network, with 30,000 kilometers of gas pipelines serving more than two million end users;
- Gas Natural continued to acquire Italian gas distribution companies and now distributes gas to 400,000 Italian customers in 187 municipalities.

Major trends underway for gas DNOs regulation in Europe

As for electricity, performance based regulation, requiring productivity improvements, is being used by European regulators (see Table 12.3). With increasing CAPEX but challenging OPEX and service targets, there is likely to be a requirement to increase distribution tariffs: UK DNOs will see a yearly 2% increase; the French gas distribution tariff for GRDF has increased by 5.6% in 2008.

Smart metering initiatives are still limited in the gas sector. However, Italy has decided to provide Automated Meter Reading (AMR) to all customers by 2016. A few operators initiated programs in this field for commercial and industrial customers. The main initiatives are conducted by National Grid in UK and GRDF, the French DNO who decided to implement AMR for all its industrial and commercial customers, and some DNOs which are developing AMR jointly for their electricity and gas customers, such as Dutch Utilities.

Table 12.3 Gas distribution regulatory regime (2008)

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)
Belgium, Portugal, Czech Rep., Poland	France*, Austria, UK, Denmark, Ireland, Germany, Netherlands, Italy, Spain

*Note: *incentive based regulation implemented for GrDF in 2008 and in 2009 for local DNOs*
Source: ERGEG – Capgemini analysis, EEMO11

Capgemini capabilities in leading benchmarks: an example with the gas DNO benchmark

Continuing its tradition of benchmarking along the energy value chain (electricity distribution costs, performance, transmission cost performance and retail mass market Cost to Serve/Cost to Acquire benchmarks), **Capgemini has conducted a benchmark[a] on the operating costs of gas distribution networks operators (DNOs) in 2008.** There were 32 DNOs from ten countries in Europe covered in the benchmark study.

The objective was to understand DNOs costs and assess their relative economic efficiency based on controllable OPEX comparisons.

After cost normalization, we found four main costs drivers explaining the difference of OPEX levels between gas DNOs:

- The size of activity;
- The kind of material used to build the network: ductile and cast iron cost significantly more to operate than any other technology;
- The age of the operated grids: the average age of all DNOs networks is about 18 years with older networks potentially having network OPEX costs of up to 30%;
- The degree of urbanization: very urban operation areas are more expensive to operate.

This study enabled the participants to have an objective comparison of their controllable OPEX taking into account the operating environment. We assessed the operating efficiency of each DNO and estimated the amount of potential cost improvement compared to the best performers.

The average full costs of these DNOs stand at €192/customer and we found the average controllable costs (network OPEX, customer OPEX, administrative costs) at €75/customer but varying by a ratio of one to eight. **After correction of the main costs factors the efficiency differences between DNOs in Europe still vary widely. Significant savings are possible.**

a) European Gas Distribution Networks Performance Benchmarking, Capgemini, February 2009

Sustainable Energy and Climate Change

For the first time, all energy fundamentals improved at the right pace in 2007. The 2008 situation will probably be more contrasted

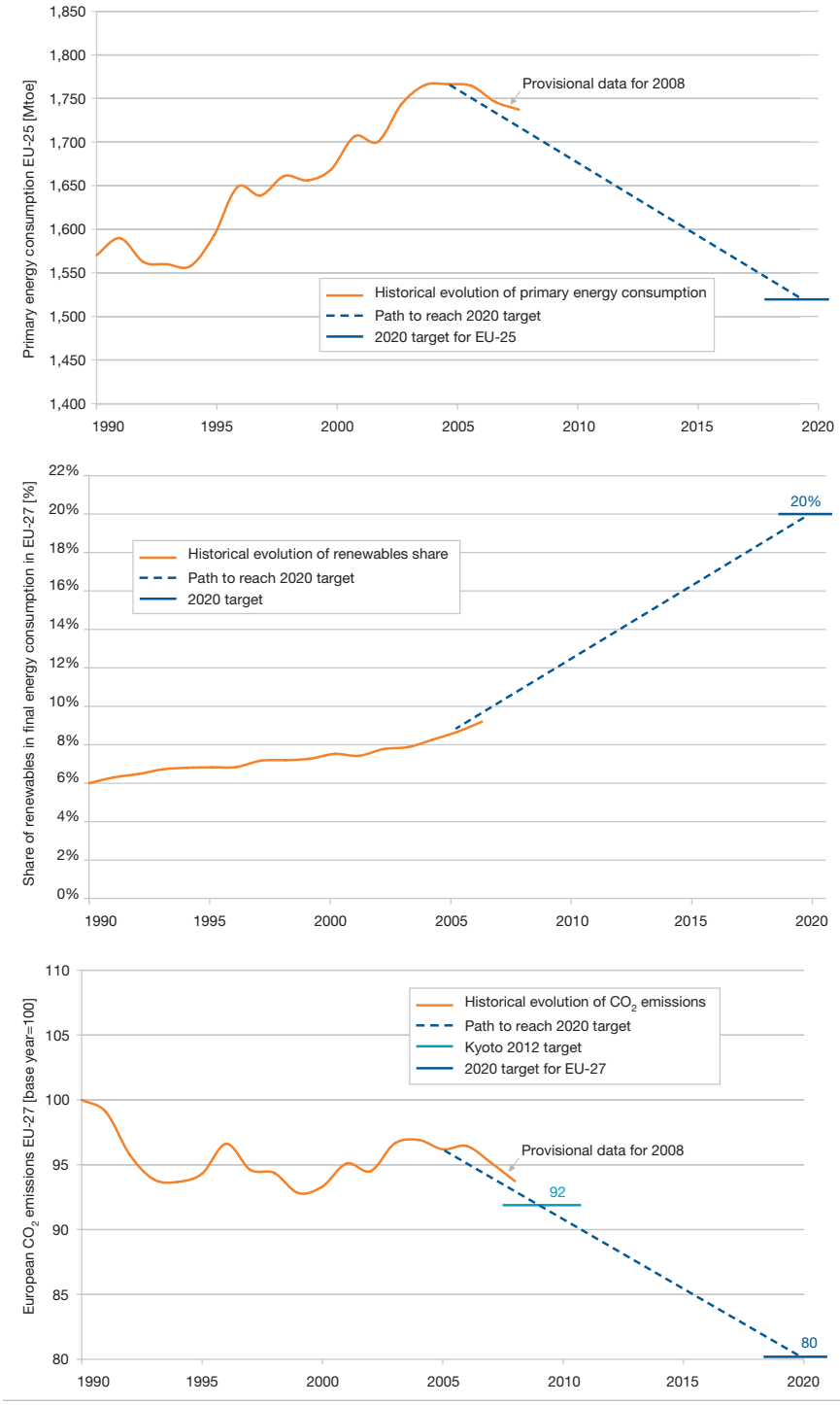
European official state-level energy statistics are published with a one year delay so the 2008 comprehensive figures at the European level are not yet available. Therefore, the global picture refers to 2007 figures but whenever possible, we have included partial analysis on 2008 based on alternative data.

Climate change mitigation is a race against time. In 2007, the good news is that Europe not only moved in the right direction, confirming the 2006 trend, but also improved nearly all its energy sustainability indicators for the first time.

The 2007 key indicators' levels confirmed the improvement foreseen in 2006 (see Tables 13.1).

- The primary energy consumption and final energy consumption decreased respectively by 1% and 1.5%, breaking the trend of average annual growth rate of +0.5% for the two indicators during the last decade, which is partly due to favorable weather conditions (mild winter, cool summer). However, this improvement, even if maintained, could be slower in 2008, with only a 0.2% reduction as reported by the BP statistical report of world energy 2009;
- The share of renewable in primary energy consumption[22] increased to a total of 7.7% in 2007, (+0.7% versus +0.3% on average during the last decade). However, the EU-27 indicative target of 21% of electricity produced from renewable energy sources in 2010 is unlikely to be met, with 15.6% in 2007 (up 1% in 2007 compared to an average of 0.3% during the last decade);
- The GHG Emissions decreased by 1.2% in 2007, with two main features: a reduction of CO_2 emissions from heating of households and services due to a warmer winter; and a reduction of CH_4

Tables 13.1 3x20 EU climate change objectives (status as of 2008 with provisional data)



Source: Eurostat, EEA, BP statistical review of world energy 2009, European Commission – Capgemini analysis, EEMO11

[22] The share of renewable in final energy consumption, the reference for the EU 3x20 objectives, is not available

C. Lewiner (ed.), *European Energy Markets Observatory*, DOI 10.1007/978-94-007-0101-4_5,
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emissions in Germany and the UK due to improvements in the gas distribution, and a reduction in coal mining. Provisional data from the European Environment Agency shows a 1.5% decrease for 2008.

Member States face a big challenge keeping up with this positive development and sticking to plans despite global economic recession. Not to mention that cutting GHG emissions by a factor of four by the year 2050 requires a -3% yearly reduction, which is a major task.

What is the progress in international regulations regarding energy sustainability?

The path towards a post-Kyoto agreement in Copenhagen is challenging

The agreement for CO_2 emissions governance after 2012 ("post-Kyoto") should be finalized at the UN Conference in Copenhagen in December 2009. The negotiations in Poznan in December 2008 (with the absence of the US which was in the middle of its presidential election) did not show significant progress.

By the end of 2009, countries will have to agree on the following priorities:

- Cap global warming at +2°C by committing to reducing the GHG emissions in a balanced manner between Western countries (EU-27, US, etc) and the developing countries (China, India, Brazil, etc); and define the milestones needed;
- Agree on the means of financing the funds that will support the adaptation of the countries and the mitigation of emissions, essentially targeting the developing countries, most concerned by the climate change effects;
- Identify governance that will guarantee an equal decision making process between developed and developing countries to deploy technology and finance.

The state of negotiations at mid-2009 between countries was showing more divergences than convergences:

- The EU, as a leader of the debate, has requested developing countries to commit to reduce emissions by between 25 and 40% by 2020, and by 80 to 95%

Copenhagen: a useless meeting? C/M/S/ Bureau Francis Lefebvre

After a time for principles (Rio, Kyoto), and a time for experiments (the EU CO_2 Emissions Trading Scheme and Kyoto flexibility mechanisms), the time for commitments has been addressed in the climate negotiations under the aegis of the United Nations. **Accelerating climate change makes progress urgent.**

However, **pessimism reigns,** as the Copenhagen Conference of Parties approaches (December 2009), despite the proactivity displayed by the G8 at the L'Aquila summit in July and the US' acceptance of the objective of setting a ceiling of 2°C warming by 2050. The end of President Barak Obama's grace period, the economic crisis, and the diplomatic tensions between diplomatic blocks no doubt explain why positions are still so far apart, even if there are still interim negotiations including the G20 summit in Pittsburgh that took place at the end of September.

The stance taken by the blocks has crystallized around four main themes:

1. The quantified commitments to the reduction of emissions by the industrialized countries in 2020, with respect to which not all those countries are ready to commit, while the emerging countries demand that they reach 40% before they themselves commit (the EU suggests 30%, Japan 25% and the United States 4%);
2. The level of technology transfer (China wants 1% of the GDP of the industrialized countries), and aid towards the implementation of environmental policies in the developing countries. The industrialized countries outside Europe have not commented;
3. The possible creation of carbon duties on the products of countries not signing up to quantified commitments, which the developing countries resolutely reject;
4. Monitoring and governance of the worldwide system for combating climate warming.

Despite European proactivity, the real negotiations might be deferred to the December 2010 Conference after voting on the US Climate and Economic Recovery Act.

by 2050 following IPCC recommendations;

- The new US government has announced that the US will not reduce their emissions further than by 17% by 2020 compared with the 2005 figures (a reduction of 4% compared with 1990) as announced in the American Clean Energy Security Act, so-called "Waxman-Markey" law adopted on June 26, 2009, but still to be voted by the Senate;
- Led by China, developing countries (India, Brazil, etc) refuse articulated targets with regards to their right to unrestricted development. China has urged developed countries to commit to the more ambitious targets of up to 40% by 2020, and wants a clear distinction between real reduction and those related to investment made under the Clean Development Mechanism (CDM).

There are also some positive points. Most of the countries agreed on the Mexican proposition to create a "Green Fund" fed by each country in proportion to their GDP and their total emissions. And the number, as well as the intensity of the preparation debates to Copenhagen, has been growing since the beginning of the year – with about 15 meetings scheduled only for the last quarter of 2009 (Bangkok, Barcelona, Pittsburgh).

Yet, as of early September 2009, the major current barrier between US and Europe administrations is that the US wishes to propose a new system less constraining and radically different from the Kyoto one, while Europe considers that it is key to negotiate evolutions on the basis of the existing Kyoto system, in order to avoid loosing another several precious years in agreeing on a fully new system. Ban Ki-moon, the UN General Secretary said he was "deeply concerned that the negotiation is not making much headway [and] it is absolutely and crucially important for the leaders to demonstrate their political will and leadership". (see Box on Copenhagen).

European Energy Policy: a matter of necessity C|M|S| Bureau Francis Lefebvre

The construction of the European Community (EC) was born out of coal and steel, and the Euratom Treaty is twin to the EC Treaty. However, we must await the enforcement of the Lisbon Treaty before EU authorities are at last given "shared jurisdiction" in the key energy sector providing the second Irish referendum be positive and if the ratification procedure is concluded everywhere.

Nevertheless, **the bases of this European policy are clearly set out by the "Climate-Energy" Package adopted in December 2008,** one of the most tangible gains established during the French presidency. Logic has thus been somewhat turned on its head.

The result of the last elections to the European Parliament should not upset the EU approach to these issues. The parliamentarians have for years now been supportive of the Commission and the Council approach, while nonetheless maintaining their differences (attachment to unbundling of transmission network operators and to gas supply security, hostility to nuclear power, inter alia) and not always achieving unanimity.

The aims of this policy are now known and their hierarchy is without a doubt inverted **with respect to their chronological appearance. The priorities are Europe's active contribution to the fight against climate warning; supply security and solidarity in the event of a supply crisis (strengthened by the new "gas" directive); development of sources of renewable energy; energy efficiency; and Research & Development.**

Henceforth, the challenges now lie in implementation methods:

- Negotiating "Copenhagen";
- Extension of the EU Emissions Trading Scheme;
- Creation of carbon taxes internally and/or at EU borders;
- Concurrent gas pipeline projects connecting Europe to Russia and the Caspian Sea;
- Development of LNG;
- Ten-year investment plans and reinforcement of interconnections;
- Relaunching nuclear energy;
- Carbon Capture and Storage;
- Smart metering;
- New eco-design laws (buildings, domestic equipment, and light bulbs); and
- Clean transport (low emissions, labeling of tires, and electric transport).

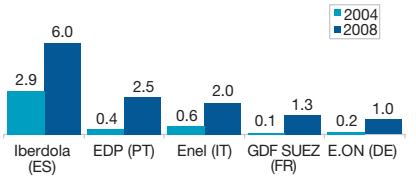
Two much more ambitious aims remain in limbo: setting up a shared gas purchasing body; and the coordination of energy mixes (with respect to which the Member States still have sovereignty in the new Treaty).

Within Europe, the "Climate-Energy" Package is definitely adopted – now key details are under negotiation, such as the allowances auctioning process or the list of protected sectors keeping free allocations

The EU "Climate-Energy" Package has definitely been adopted by the European Council in April 2009. The revision of the EU-ETS Directive concentrated most of the debates. Some concessions have been made compared to the initial legislative proposal:

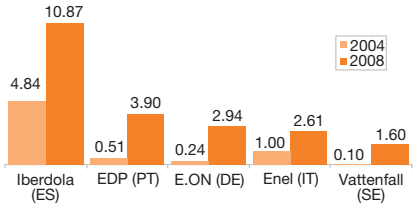
- From 2013 onwards, no free allocation will be made in respect of electricity production, except for electricity produced from waste gases and for

Top 5 - Wind Installed Capacity in GW (2008)



Source: Companies' annual reports - Capgemini analysis, EEMO11

Top 5 - Wind electricity generation in TWh (2008)



Source: Companies' annual reports - Capgemini analysis, EEMO11

existing power plants in specific countries that will, under conditions, benefit from a progressive auctioning of their emissions allowances (mostly Eastern countries). The EC considers that this will result in a rise in electricity prices of 10 to 15%;

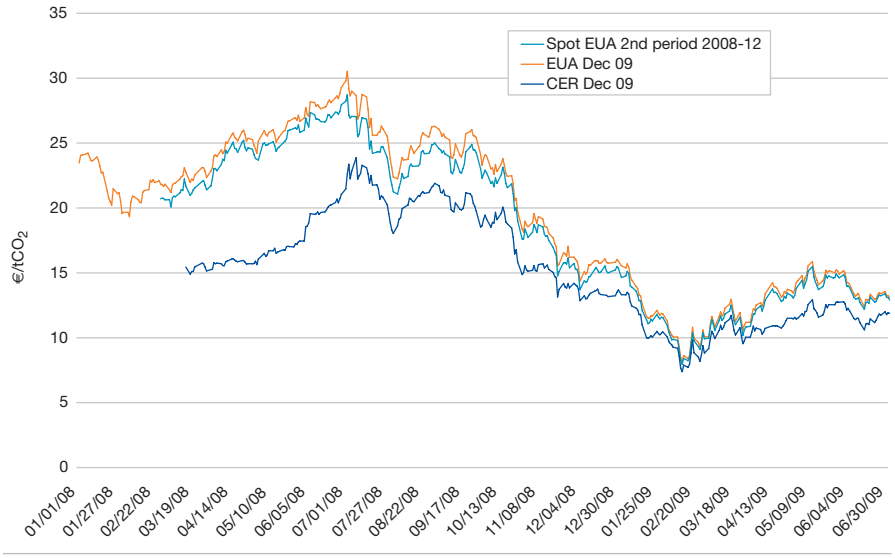
- Over the 2013-2020 phase, industries that are at risk of carbon leakage (= delocalization) will be granted 100% free allowances, at a quantity based on ex-ante benchmarks, unless a new international agreement on climate change considerably changes the market. A provisional list of 258 sectors was published in April 2009. The final list should be published in December 2009, while the definitive rules for free allocation based on benchmarks should be adopted by December 2010;
- For all other EU-ETS industries (including heating and cooling), free allocation will remain possible as a transitional measure until 2027;
- After 2012, more than one billion allowances will be auctioned every year, compared to less than 65 million in phase II. The market framework is being discussed now, and should be finalized by June 2010. They should aim at avoiding collusion, and facilitate the access of small players, deciding on the participation of financial intermediaries that have a positive impact on the liquidity and level of price of the market.

Also, part of the EU "Climate-Energy" Package, the Green Directive sets a new frame for the development of renewable energies

Part of the EU "Climate-Energy" Package, the Renewable Energy Sources Directive (2009/28/EC) entered into force in May 2009. This directive defines the framework conditions for the development of Renewable Energy Sources (RES) in Europe over the next 12 years.

- It sets transparent and clear rules for defining renewable sources and calculating the share of energy from renewable sources. From June 2010, each Member State will have to submit its national renewable action plan detailing how to reach its national target for the share of renewable energy in transport, electricity, heating and cooling;
- It allows efforts sharing between States through "statistical transfers" once a year at national levels. It is a kind of cross-border exchange of renewable achievements between States;
  - On one hand, statistical transfers keep every government responsible for its own support policy, as it avoids the creation of Green Tradable Certificates (GTC) for private entities at European level, which had been a hot negotiation issue in late 2008 between governments, large electro-intensive industries, and the renewable industry and the non-governmental organization (NGO) sector;

Table 13.2 CO_2 prices (2008 and H1 2009)



Source: SG Commodity Research – Capgemini analysis, EEMO11

- On the other hand with no regulation on GTCs at European level, the situation will remain unclear at commercialization level to end users. Today an electro-intensive consumer or fossil-based Utility can buy green certificates in order to "greenwash" its electricity consumption at a cost close to zero euros, because its greenness is often double-counted.

CO_2 markets are in a transitory period due to the crisis and expectations around Copenhagen summit

The CO_2 markets showed highs and lows correlated with energy prices, with exceptional volumes in 2009 due to "piggy banking" opportunity

All but one EU-27 Member States had their NAP II plans validated by the EC (Bulgaria is still pending).

For the first time, the ETS sector showed a theoretical shortage of allowances in 2008. In 2008, CO_2 emissions reduced by 3.7%, but 5.9% less allowances have been allocated for the phase II (2008-2012) compared to the phase I (2005-2007). As a result, instead of being long by 3% compared to previous year, the market is theoretically short by almost 6%. The electricity sector was short by 24%, explaining why 75% of the gross demand of allowances comes from the electricity sector. The refinery sector was short for the first time. The remaining industries have cut their emissions by 10% in 2008 (20% as of July 2009) because of the economic decline. Of the countries Germany was short by 44%, the UK by 27%, Italy by 8% and Spain by 7%.

During 2008, the quota prices showed high volatility, correlated with the oil and coal prices.

After highs of €27/tCO_2eq in 2008 and lows at €10/tCO_2eq, the CO_2 was exchanged at €13-14 levels during the summer of 2009 (see Table 13.2).

A positive outcome of the change of CO_2 prices has been the fuel switch from coal to gas since April 2009. The coal to gas switch is believed to be the major opportunity to reduce power emissions during the 2008-2020 period.

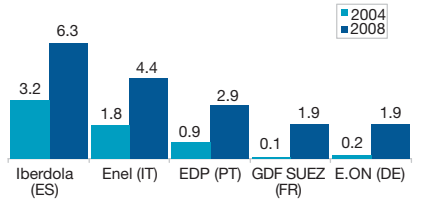
Surprisingly, the exchanged volumes have been a record high despite the economic downturn. One explanation is that companies are using CO_2 markets as "piggy banks", i.e. a less expensive way of financing than borrowing on financial markets. It is done by companies using the possibility to borrow CO_2 quotas for the upcoming year and sell the allowances they were granted for free today, compensated by buying CO_2 futures that will be paid within two years (2012 at the soonest). This mechanism allows companies to create liquidity, by borrowing money at rates lower than the financial market, while at the same time ensuring they are covered for their future CO_2 sourcing at nearly today's price.

CDM markets are on hold, waiting for post-Kyoto visibility

5,173 Clean Development Mechanism (CDM) projects have been registered until July 2009 by energy producers or highly polluting industries in developed countries. The number of projects entering the CDM's approval process has declined since November 2008, going from an average of 130 per month to some 112 projects per month with an all time low of 75 in February 2009.

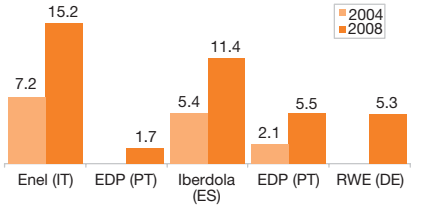
The economic downturn and financial crisis is the major reason for motivating carbon market investors to scale down, delay or cancel their investments in carbon credit projects. The future of CDM (and its revenues) is closely linked to the post-2012 agreement on greenhouse gas reduction.

Top 5 - Other RES (than hydro and wind) installed capacity in GW (2008)



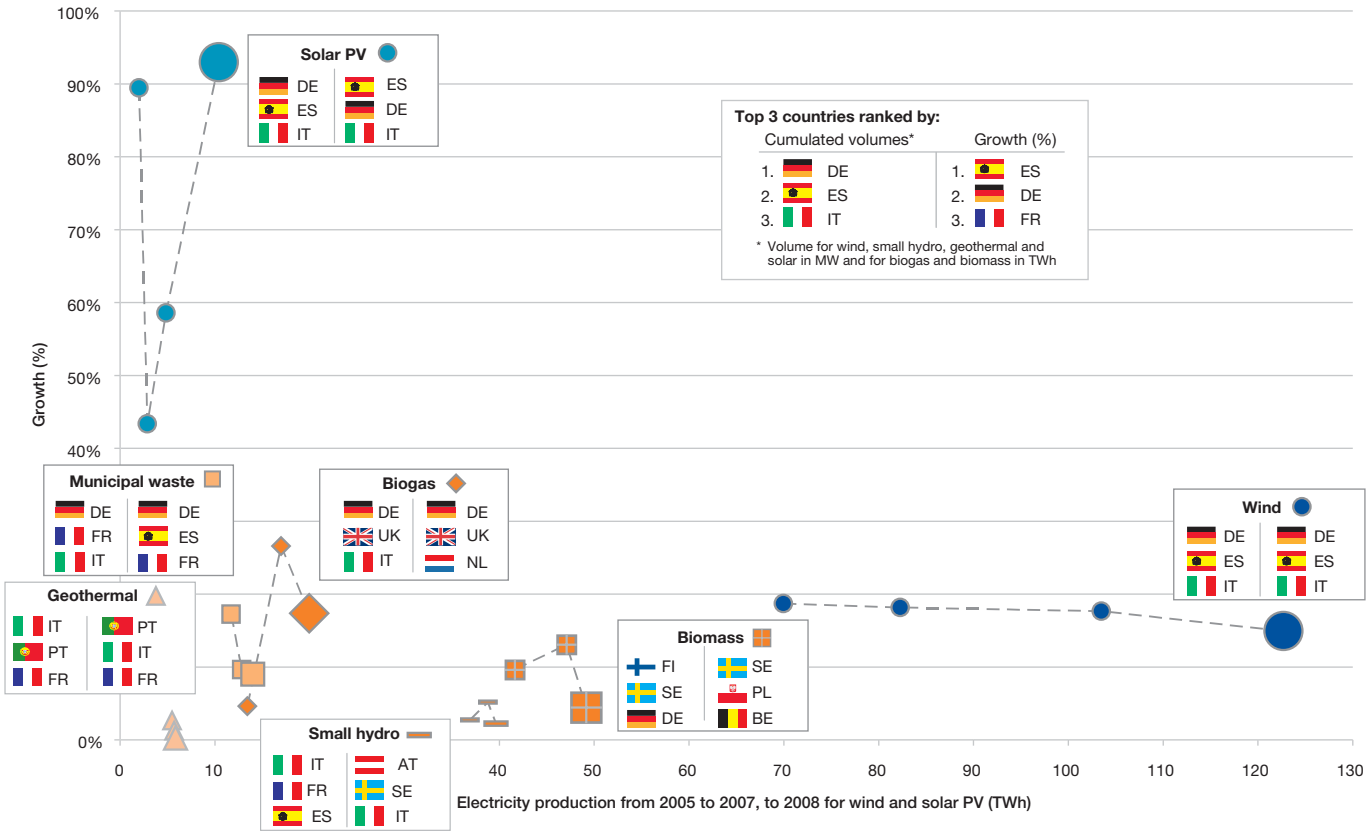
Source: Companies' annual reports - Capgemini analysis, EEMO11

Top 5 - Other RES (than hydro and wind) electricity generation in TWh (2008)



Source: Companies' annual reports - Capgemini analysis, EEMO11

Table 13.3 Growth rate of electricity generated from RES (2007 and 2008)



Source: Eur'Observer barometers and 10th Eur'Observer Inventory – Capgemini analysis, EEMO11

The sustainable energy sector resisted in 2008 – the real test and the opportunities generated by the crisis will come in 2009/2010

Renewable capacities faced contrasted developments in 2007/2008

Solar photovoltaic was the star of renewables in 2008 (see Table 13.3): the cumulated European capacity almost doubled in one year, up to 10 GW (+ 4.5 GW). Germany, the previous world market leader, was overtaken by Spain. Spain installed an incredible 2,600 MW, i.e. half the worldwide market all-of-the-sudden. Yet the Spanish government announced that for 2009 onwards, it would cap the subsidies to 500 MW. With such a reduction of the Spanish demand, the worldwide PV solar market is estimated to decrease by 17%, while manufacturing continues to grow by +56%. Prices of solar panels consequently plummeted by 20%. The number two worldwide cell producer, Q-Cells, decided to cut 25% of its workforce in August 2009.

Wind remains the primary technology to reach the EU 3x20 renewable targets. With 121 GW wind capacity end of 2008, the market is stabilizing to 8.4 GW newly installed capacity in 2008, about the same as in 2007. However, it is still the largest RES source for generating electricity in the EU, representing nearly 8% of the total European installed capacity at the end of 2008.

During the first half of 2009, due to cancelled projects, the equipment manufacturers started to announce a slowdown in production growth, and there might be more problems ahead for the manufacturers as they sit on commodity hedging contracts based on pre-crisis prices. In 2009, Vestas closed 1,500 jobs in the UK and Denmark in order to partially re-focus its activity on the US and China. Independent project developers report that equipment lead-time is going from 18-24 months to immediate delivery, but with lower levels of customization, due to cancelled projects. This has led to great opportunities for liquid, fast-moving

buyers in markets with quick planning and approval cycles. This may explain why the European Wind Energy Association (EWEA) forecasts an 8.6 GW increase for 2009, which is an equivalent level compared to the previous years. Yet EWEA remains cautious and warns that the financial crisis may have a deeper impact in 2010, unless measures are taken rapidly to increase liquidity in the financial market.

A first consequence of the crisis and of the maturity of the markets is the opportunity to consolidate actors and the emergence of global wind operators. Over the last months, the wind assets of bankrupted Babcock & Brown, a major worldwide wind park owner, were bought by other players. A second consequence that can be observed is the increasing focus on excellence in operations, maintenance, spare parts, as wind assets get larger and financial pressure increases.

Other renewables are seeing growth too, but not enough to match either the 2012 nor the 2020 objectives. Biogas utilization is progressing but biomass remains under-used compared to its potential for reaching the 2020 objectives, second after wind. Only Germany is having an efficient policy. It increased biomass utilization by 50% and electricity generated with biomass by 100% over the last four years.

Regarding other clean techs, CCS drove high attention in 2007 with high expectations and the adoption of European directives. Yet 2008/2009 did not show the expected progress in terms of number of really engaged investments and projects. (See Box on CCS).

The spending in renewable power sources slowed down as the lending market was hit in mid 2008

Starting from the second half of 2008, the world saw the first slowdown in spending in sustainable energy, dropping from US$36 billion in Q2 2008 to US$32 billion in Q3 and even US$23 billion in Q4[23]. In Europe, an increase of investment is still recorded (+2% in 2008 versus 2007), but far less than the 2004-2008 CAGR of 56%. Europe remained the biggest investor in 2008 and counted for 41% of the total new investment. The IEA suggests a global drop of about 38% in 2009 in renewables-based power projects,

How to make energy savings smart, fun and attractive?

Designing Smart Energy is an innovative research project for new solutions to help households save energy in an easy, effortless and even funny way through combined marketing and design expertise. Capgemini funded the project along with six other Nordic energy companies and the Finnish agency for technology and innovation. The project is led by the Western Finland Design Centre MUOVA, the University VAASA EMG and Interactive Institute Power (Sweden).

This project aims to:

- **Deepen customer knowledge through quantitative and narrative studies** (1,300 questionnaires and 50 narratives were analyzed). **Five customer families were identified and were segmented in relation to attitudes and behaviors towards energy:** reluctant energy saver, insensitive energy user, active energy saver, passionate ecologist, and unaware energy consumer (about 20% each). Levers such as communication, reward schemes, and intelligent systems were investigated;
- **Develop four design projects out of 14 initial concepts.** Expert interviews, operational design, user concept testing phases and focusing communication helped to assess the customer appreciation and the relevance towards customers segments.

The energy plant: one of the concepts developed in the DESME project
The plant flourishes with energy savings and fades when consumption outreaches the energy budget decided by the user.

It is up to local authorities, Utilities and customers' organizations to make it fun, properly targeted and to make it also a common positive civic experience. The successful existing experiences in electricity savings work right when done this way.

Capgemini derived from the DESME project and from its own experience a methodology in four parts for addressing smart energy projects:

1. Identify the top three strategic objectives of the company regarding Energy Savings / Smart Energy (Is it only communication driven? Are there real concerns about energy and peak savings? Are there hot issues related to customers' retention or acquisition?).
2. Segment the markets (industries, commercials, households) through multi dimensional analysis (consumption levels, usage profiles, behaviors and attitudes).
3. Define actions and priorities for each of the sub-segments.
4. Rollout communication actions and offerings.

[23] Global trends in sustainable energy investment 2009, UNEP/New Energy Finance, May 2009

partly based on the first quarter data suggesting a 42% drop in spending compared to the previous quarter[24] and UNEP data shows a 53% decline in new investments in Q1 2009 (US$13.3 billion) compared to Q1 2008.

The basis for the decline is a number of reasons. Credit is hard to obtain, and for the projects that find credit, the process is more complex and the loans often involve a cluster of banks. Additionally, the effects of decreasing power prices, partly due to a big drop in carbon prices, has further undermined the ability to finance new and existing renewable projects. The price in some areas have decreased so much that many recently completed wind projects are at a standstill as operating costs are too high to make a healthy margin.

Initial public offering market, mergers & acquisitions and innovation in clean tech is taking a blow

In late 2008 and early 2009 it became evident that a systemic shock has hit the clean tech finance ecosystem. The IPO market was "dead" during the winter 2008/2009 and the spring of 2009, and the mergers and acquisitions proceedings are now more cautious with longer lead times and lower valuations. On a global level, UNEP reported decreasing levels of new investments in 2008 for several technologies, with low carbon technologies losing the most (-37%), efficiency (-33%), biomass (-25%) and biofuels (-9%)[25].

Economic stimulus packages have a green component which has partially reignited growth

All around the world, governments have identified renewable energy as an important area to kick-start the economy through "green deals".

- A €4 billion energy infrastructure investment plan was adopted by the EU Member States leaders in May 2009. €565 million was earmarked for specific offshore wind projects and related grid improvements. In France, the Grenelle de l'Environment was introduced and in an attempt to stimulate the ailing UK

What are the pre-requisites for electric vehicles development?

In the quest to mitigate CO_2 emissions from the transportation sector and better utilize base load during non-peak hours, several European Utilities have entered into co-operation with car manufacturers to develop electric hybrid vehicles. To be cleaner than fossil fuels, the CO_2 intensity of the electricity must be lower than 500gCO_2/KWh, excluding coal generation for the additional electricity needed. **In France, e-cars are predicted to absorb the equivalent of one to two nuclear reactors by 2020.**

The cars are segmented into full plug-in hybrid vehicles (PIHV) which has a combined combustion and electrical engine, and 100% electric vehicles. Focus is primarily on the first category since they can enter the market already in two to three years. **The industry forecast is that PIHV will have 10 to 20% of the market share of new vehicles in Europe by 2020,** making it 2 to 5% of total vehicles on the roads.

Opinions differ on the grid infrastructure need and its costs. Varying conditions exist in Europe. For example the Nordic countries already have in place an infrastructure of outlets for vehicle engine pre-heaters (utilized during the winter), which could be used for charging a PIHV.

Home and at work outlets are to a large extent considered enough for developing the market, despite low ampere and several hours loading times. **Developing the public infrastructure is a condition to the penetration of electric vehicles in the rest of Europe, and this will be done at a high cost.** Arguably the costs for loading points would lower with increasing volumes.

Standardization is a pre-requisite for a mass market application. Working groups at European level are already working on defining common electric standards in order to allow electric vehicles to go cross border throughout Europe.

[24] The Impact of the Financial and Economic Crisis on Global Energy Investment, International Energy Agency, May 2009

[25] Global trends in sustainable energy investment 2009, UNEP/New Energy Finance, May 2009

wind industry, the UK Prime Minister included several wind specific items in his June 2009 crisis bill;

- The US "Stimulus Bill" allows investments of US$45 billion in new energy related expenditure, US$20 billion in new tax cuts for energy and US$4.5 billion for investments in smart grid;
- A two-year stimulus plan was revealed by Chinese officials in late 2008 which dedicated €35 billion to green investments.

Energy savings initiatives gain momentum

Smart grids and energy automation are high on the agenda in the industry – yet a global vision needs to be enhanced at public authorities' level

Smart grids, energy automation at home and in commercial buildings are certainly the new hype for investors as well as for the industry. They can save up to 10 to 35% in peaking capacities and 0-20% in energy consumptions when combined with efficient offers or tariffs (see Box on Sustainable tariffs). Industrials and analysts estimate the market to weight several dozens of billon dollars in the next three to ten years.

Electricity industrials such as Siemens, Schneider, GE, Areva T&D are naturally in place, while ITC companies such as IBM, Google, Microsoft, Intel, Cisco, SAP, Nokia have all communicated on their involvement in smart grids and on partnerships: GE with Intel, and Google with GE.

Meanwhile young innovative high-tech companies are raising huge interest and significant funding. In the US, Silverspring has been the smart grid success story of the year: it rose over US$160 million in two years. Ember raised US$90 million in 2008 and 2009 for Zigbee communication systems that are used in many of the home automation systems.

Policymakers also become conscious that Demand Response and Smart Grids are key levers to save energy and CO_2 emissions and to allow high levels of intermittent renewable electricity. For instance the EU "Climate-Energy" Package sets the objective that 80% of the European households should benefit from smart meters by 2020.

Yet more and more smart grid observers are calling for a major policy overhaul consistent from end-to-end. In particular the full value of demand response for all stakeholders (including Utilities and citizens/customers) will not show up as long as regulated and free-market tariffs do not mirror the real-time costs of peaks, both on the deregulated supply part and on the regulated distribution part.

Governments include variable parts of energy efficiency in their climate policies when looking at creating green jobs

Beyond the hype of smart grids, the awareness and the development of regulatory tools concerning all type of energy savings is making progress.

In France the "*Grenelle de l'Environnement*" programs for sustainability have been agreed on by consensus between the economic, NGOs and governmental stakeholders in 2007-2008. They aim to get 25% energy savings by 2020 compared to the current trend. Their impact on the economy and the employment has been estimated at 600,000 jobs creations and €450 billion investments in economic activity for the next ten years. As much as about half of it will improve the energy efficiency in buildings, saving €15 billion per year, and a quarter of it in transportation efficiency. Yet as of September 2009, the programs remain to be voted by the French parliament.

In the UK, the Low-carbon Transition Plan published on July 15, 2009 estimates that 1,200,000 jobs should be created in green activities. It aims at cutting emissions by 34% on 1990 levels by 2020. As it is focused on low-CO_2 generation rather than energy efficiency, it is expected to raise energy bills by about 21% for industrial consumers and by 8% for domestic consumers. Yet the listed energy efficiency measures will limit the extra cost to €79/year/home from an estimated €213.

White certificates are now gaining momentum, after a first round of testing

The white certificate schemes consist of energy savings quotas imposed on some category of actors (distributors, suppliers, consumers). The overview in Europe is fully diversified, with saving obligations bearing on:

- Electricity, gas and heat distributors in Denmark;
- Electricity distributors without trading in Flanders (Belgium) and Ireland;
- Suppliers without certificate trading in the UK;
- Suppliers with tradable certificates in France and Italy.

Key issues in Germany

In 2008/2009, the German transmission infrastructure was affected by the incentive based regulation of grid and gas network charges and a law for the accelerated development of the transmission grid.

Consequently, the **TSOs and DNOs have to reduce their operating costs and to start new grid investments.** Additionally, European Union (EU) non compliance proceedings caused E.ON and Vattenfall Europe to start divesting their high voltage grids while RWE is selling its gas grid.

Regarding production the main issues are the **nuclear lifespan extension, CCS legislation, the auctioning of CO_2 certificates, an RES amendment** granting higher compensations for windmills, and a potential power supply gap from 2012. Based on this, 40 to 60 new power plants are planned. However, new coal-fired plants are hampered by legal requirements and public resistance.

Simultaneous malfunctions in nuclear power plants have undermined extended runtimes and windmills sites are limited (onshore) or technically challenging (offshore). Accordingly – and despite the crisis – **E.ON, RWE, Vattenfall, and EnBW are investing abroad, especially in nuclear power plants and renewables**: E.ON and RWE in the UK (nuclear and offshore). Another way has been to acquire smaller players such as Essent by RWE. While E.ON, on the other hand, disposed market shares to a new number five player on the German market by selling Thüga to the municipal consortium Integra/KOM9.

Finally, **7.4% of electricity customers switched to a new electricity supplier or changed their tariff in 2008.** Since September 2008 their area of choice is further extended into metering services.

The targets for the three first years in the UK, Italy and France were easily met. Yet the objectives are progressively getting some significance compared to the 1% increase in energy efficiency mandated by the directive 2006/32 on energy end-use efficiency and energy services. Besides, Poland, Romania and Bulgaria are now at several stages of implementation of white certificates.

In the UK, the Energy Efficiency Commitment (EEC) 2005-2008 was labelled in kWh to be saved. The EEC has been transformed into the Carbon Emissions Reduction Target (CERT) for the 2008-2011 period. The target of 185 $MtCO_2$ (lifetime) will have to be collectively achieved by the energy suppliers by end of March 2011. Overall, some €3.7 billion will be channelled to help households become more energy-efficient.

In France, the first phase achieved 65 TWh CUMAC (cumulated & actualised savings) for a target of 54 TWh over three years, accounting for 0.25% of the final energy consumption. With only 4% of total volume, the trading market was too marginal to be representative (€0.32 c/kWh CUMAC). The period was long and the Utilities didn't need to buy certificates on the market. It remains unclear how far this first phase really fostered new additional energy savings. The French Energy and Environment Minister announced that the objectives for the second phase should be multiplied at least by a factor of 5.5 from 17 TWh yearly to 100 TWh for a doubled perimeter (inclusion of gasoline suppliers).

In Italy, the first phase (2005-2008) achieved 180% of the target (23 TWh for a target of 13 TWh of primary energy savings). At the end of the first phase, market prices dropped by 50% for electricity white certificates. Several measures, including hardening the initial objectives for 2008 by about half, restored stability in the market. During H1 2009, about one million certificates (12 TWh) have been traded at an average value of €6/MWh (about €70/certificate).

In Poland, the second round of consultations on the White Certificates Systems is underway during. The white scheme will set energy saving obligations on energy suppliers, distributors and end users. The companies which will not comply will need to pay compensatory fees of €20 to 60/MWh. According to the Polish government, the cost of implementation is estimated at €0.4-0.6 billion in the next two to three years and €2.6-3.9 billion in 2011-2020. However, energy savings in the respective periods are expected to reach €0.3 billion and €2.8 billion. It may initially result in a 1-3% increase in power prices, but streamlining energy consumption would stimulate supply and competition resulting in lowering energy prices.

The economic crisis is pushing industrials to improve their energy efficiency

In 2007, the energy intensity decreased sharply by 3.7% (-1.8% on average during the last decade). This figure appears to be quite significant compared to previous years and makes us think that it reflects not only a lower consumption from households thanks to a mild winter but also a real improvement in energy efficiency in all customers segments.

In 2008 and 2009, the economic activity was hardly hurt by the crisis (-4% on EU-27 GDP is forecasted for 2009[26]), thus decreasing the energy intensity. It has been observed that every crisis since 1929 pushed the older inefficient power plants to close, thus giving way to more efficient electricity generation at the time of economic rebound.

Business consumers have put energy savings high on their agenda, although not necessarily for the sake of climate change but driven by the need to lower costs of operation in the wake of the economic crisis. Studies show that three out of four companies will make energy savings a high or medium priority[27].

Yet more remains to be done in terms of efficiency policies, IEA says to G8

The IEA reports[28] that no G8 country has fully or substantially implemented more than 55% of the IEA recommendations for energy efficiency policies. The UK and Japan stood first in the IEA ranking of G8 countries, followed by Germany and France, while Italy, US, Canada and Russia closed the ranking.

The EC has remained active under the Swedish presidency during H2 2009: the Energy Performance of Buildings Directive (EPBD) about new construction and renovation, smart metering, as well as the directive on electric appliances (ecodesign, labelling, communications) will be strengthened and extended to all products and services having impacts on the energy consumptions of the buildings (they represent 40% of final energy consumption).

[26] International Monetary Fund

[27] "Countdown to Copenhagen, governments, business and the battle against global warming" Economist Intelligence Unit, February 2009

[28] Progress with implementing energy efficiency policies, IEA, G8 Summit, July 2009

Finance and Valuation*

In the 11th edition of our European Energy Markets Observatory, we examine a broader sample of companies than in our last edition. Our sample now comprises 43 companies (see Table 14.1) compared with 33 companies in 2008. This stock sample is more representative of the sector. The data used in our analysis is for 2008.

The companies in our sample generate aggregate revenues of €644 billion, representing nearly 90% of the industry's total revenues, up 20% versus 2007 on a comparable group structure basis. These companies all belong to the Utilities sector, but the sub-segments in which they operate vary:

- Electricity companies represent approximately 50% of the Utilities market in terms of revenues;
- Integrated gas and electricity companies, of which we have identified three – E.ON, GDF SUEZ and Gas Natural/Union Fenosa – represent approximately 30% of our sample;
- Gas companies represent approximately 15% of our sample;
- Network companies (gas or electric) represent 5% of the companies in our sample.

Electricity companies have seen their revenue growth outpace their volume growth

Electricity companies have experienced robust revenue growth (see Table 14.2): +19.5% per year on average over the 2004-2008 period while their volumes (TWh) have risen 4.4% per year over the same period.

We attribute the pick-up in revenues versus volume growth to:

- The trend in prices, which were high in 2008 (average spot prices in Europe rose 70% in 2008 versus 2007 at both the purchasing price and the selling price levels, depending on whether the company produces or sells electricity);
- Additional service offerings, i.e. repairs, connections, by players such as EDF, RWE and Scottish & Southern Energy.

No clear trend has emerged in terms of the revenue growth generated by companies in the gas sector, mostly because their gas prices, and hence their revenues, are generally linked to oil prices. Network companies offer better visibility than the other sub-segments because the bulk of their revenues are set by local regulators.

Corporate margins have increased far less than revenues, leading companies to implement cost-cutting plans

The EBITDA generated by the companies in our sample rose 8.5% in 2008 versus 2007, weaker than the pace of revenue growth (+20%) in 2008. We attribute this primarily to an increase in:

- Direct production costs (gas – the price of which is linked to oil prices, with a time lag of about six months – coal, oil and CO_2);
- Labor costs;
- To a lesser extent, external service costs, including outsourcing.

Key issues in Denmark

With the UN Climate Conference happening in Copenhagen in December 2009, **Denmark is emphasizing new national policies that promotes renewable energy, energy saving, a better environment and higher subsidies for renewable energy.**

A new tax reform is reducing the tax burden on labor and it is making it more expensive to consume and produce goods that are burdening the environment, climate and health. The goal of this tax reform is to take a decisive step towards a more intelligent and green tax system which both reduces CO_2 emissions and energy consumption and promotes renewable energy.

After years of having a non-competitive deregulated Utility market, **the Danish government is proactively supporting initiatives** – with Energinet.dk (the Danish TSO) as the main driver – **towards more competition, transparency and the integration of renewables** in the Danish power market.

Energinet.dk will be responsible for a future electricity retail data hub. It is also building a power transmission system to bring ashore and integrate the power from the new offshore wind farms.

Better Place Denmark is working with its partners DONG Energy and the Renault-Nissan Alliance to bring about the **adoption of electrical vehicles in Denmark by 2011.**

* This chapter was written in collaboration with Société Générale Equity Research.

C. Lewiner (ed.), *European Energy Markets Observatory*, DOI 10.1007/978-94-007-0101-4_6,
© Springer Science+Business Media B.V. 2010

Table 14.1 Companies on the panel and their main characteristics (2008)

€m	Country	Type	Sales 2008	Sales 2007	Var 08/07	EBITDA 07	EBITDA 08	Var 08/07
E.ON	DE	Elec/gas	86,753	68,731	26.20%	12,501	13,385	7.10%
GDF SUEZ	FR	Elec/gas	83,053	74,252	11.90%	12,627	13,886	10.00%
Incl. GRTgaz	FR	Network	1,464	1,380	6.10%	730	733	0.40%
EDF	FR	Elec	64,279	59,637	7.80%	15,210	14,240	-6.40%
Incl. RTE	FR	Network	4,221	4,126	2.30%	1,588	1,349	-15.00%
Enel	IT	Elec	61,184	43,673	40.10%	10,023	14,318	42.90%
RWE	DE	Elec	47,500	41,053	15.70%	7,902	8,773	11.00%
Centrica	UK	Gas	29,106	24,337	19.60%	3,723	3,504	-5.90%
Iberdrola	ES	Elec	25,196	17,468	44.20%	5,538	6,412	15.80%
GasTerra	NL	Gas	23,953	17,713	35.20%	31	54	72.60%
Endesa	ES	Elec	22,836	21,931	4.10%	7,485	6,895	-7.90%
National Grid	UK	Network	21,305	17,011	25.20%	5,345	5,505	3.00%
Scottish & Southern Energy	UK	Elec	20,804	17,343	20.00%	1,906	1,931	1.30%
Vattenfall	SE	Elec	17,589	15,348	14.60%	4,835	4,913	1.60%
EnBW	DE	Elec	16,305	14,712	10.80%	2,336	2,540	8.70%
EDP	PT	Elec	13,894	11,011	26.20%	2,628	3,155	20.00%
Gas Natural	ES	Elec/gas	13,544	10,093	34.20%	2,277	2,564	12.60%
Alpiq	CH	Elec	10,392	9,485	9.60%	1,100	947	-13.90%
Essent	NL	Elec/gas	9,038	7,378	22.50%	1,499	1,544	3.00%
Dong	DK	Elec/gas	8,151	5,587	45.90%	1,302	1,827	40.30%
CEZ	CZ	Elec	7,275	6,289	15.70%	2,714	3,493	28.70%
Union Fenosa	ES	Elec/gas	7,189	6,011	19.60%	2,062	2,280	10.60%
Nuon	NL	Elec	6,147	5,650	8.80%	1,477	1,196	-19.00%
Distrigas	BE	Gas	5,936	4,126	43.90%	259	399	54.10%
Fortum	FI	Elec	5,636	4,479	25.80%	2,298	2,478	7.80%
Eneco	BE	Elec/gas	4,943	4,789	3.20%	690	695	0.70%
British Energy	UK	Elec	3,833	4,466	-14.20%	1,500	1,256	-16.30%
Verbund	AT	Elec	3,745	3,038	23.20%	1,099	1,322	20.30%
Statkraft	NO	Elec	3,149	2,139	47.20%	1,168	1,745	49.40%
MVV Energie AG	DE	Elec	2,636	2,259	16.70%	359	486	35.40%
EVN	AT	Elec/gas	2,397	2,233	7.30%	351	362	3.30%
Drax Power	UK	Elec	2,390	1,823	31.10%	744	619	-16.80%
Eni Snam Rete Gas	IT	Network	1,902	1,790	6.30%	1,511	1,511	0.00%
Gasunie	NL	Network	1,506	1,319	14.20%	831	807	-2.90%
Terna	IT	Network	1,395	1,348	3.50%	795	853	7.20%
Hafslund	NO	Elec	1,389	1,047	32.70%	316	275	-12.90%
Bord Gais	IE	Elec	1,379	1,215	13.50%	305	299	-2.00%
Red Electrica	ES	Network	1,126	1,031	9.20%	723	780	7.90%
Energinet.dk	DK	Elec	1,118	1,259	-11.20%	59	167	180.20%
Enagas	ES	Network	846	817	3.60%	596	636	6.70%
Elia	BE	Network	724	706	2.60%	309	334	8.10%
Fluxys	BE	Network	592	433	36.80%	168	312	86.00%
Statnett	NO	Network	535	415	29.00%	186	216	16.10%
TenneT	NL	Network	460	399	15.40%	132	140	6.40%
Fingrid	FI	Network	382	335	14.30%	147	127	-13.20%
Total			643,514	536,178	20.00%	119,066	129,182	8.50%

Source: SG Equity Research - Capgemini EEMO10

Bear in mind that we are looking at 2008, which was not "affected" by the crisis until the end of the year, mainly in the fourth quarter. Electricity companies, which have a long decision cycle, took some time in our view to fully appreciate the crisis and draw conclusions from it.

Another sample of companies regularly followed by SG Equity Research, representing 75% of the revenues generated by the sample of companies examined in this document, point to a two point erosion in the EBITDA margin (see Table 14.3). This is the lowest level in five years. We believe the erosion is largely due to the trend in commodity prices in 2008, when oil, coal and gas prices peaked.

For 2009, our estimates call for an increase in the EBITDA margin back to the 2007 level (21.1%), driven by two key factors:

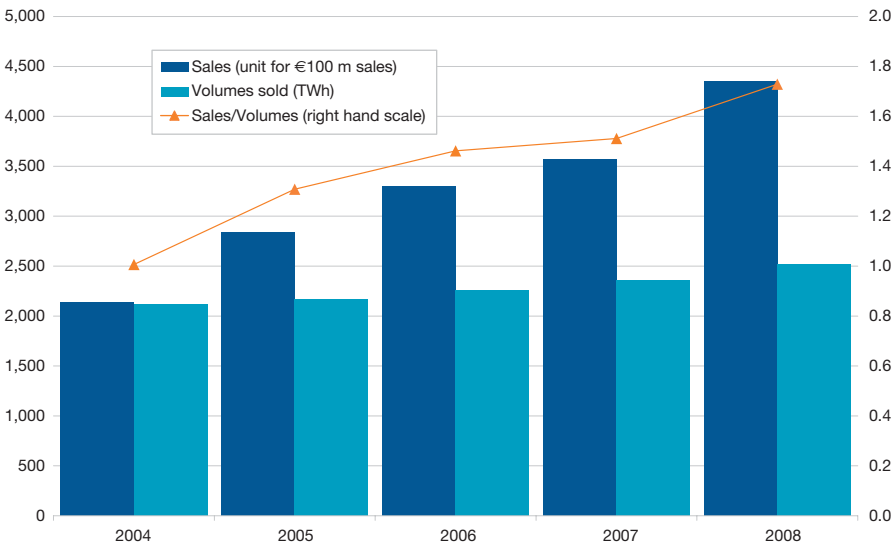
- The decrease in commodities prices;
- The implementation of cost-cutting plans.

The largest cost-cutting plans are being carried out by the following companies:

- RWE – the "Top fit" cost-cutting plan is targeting savings of €1.2 billion by 2012 (3.5% of operating costs incurred in 2006, when the plan was announced);
- E.ON – the "Perform to Win" plan is targeting €1.5 billion by 2011 (2% of operating costs incurred in 2008);
- EDF – the "operational excellence" plan is targeting €1 billion by 2010 (2.3% of operating costs incurred in 2007);
- GDF SUEZ – the "Efficio" plan is targeting €1.8 billion by 2011 (2.6% of operating costs incurred in 2008);
- Enel – the "Zenith" plan is targeting €1.4 billion by 2011 (3% of operating costs incurred in 2008). The company also plans to cut its working capital requirements by €1.3 billion by 2011, in addition to making €1.4 billion in cost reductions through the Zenith plan.

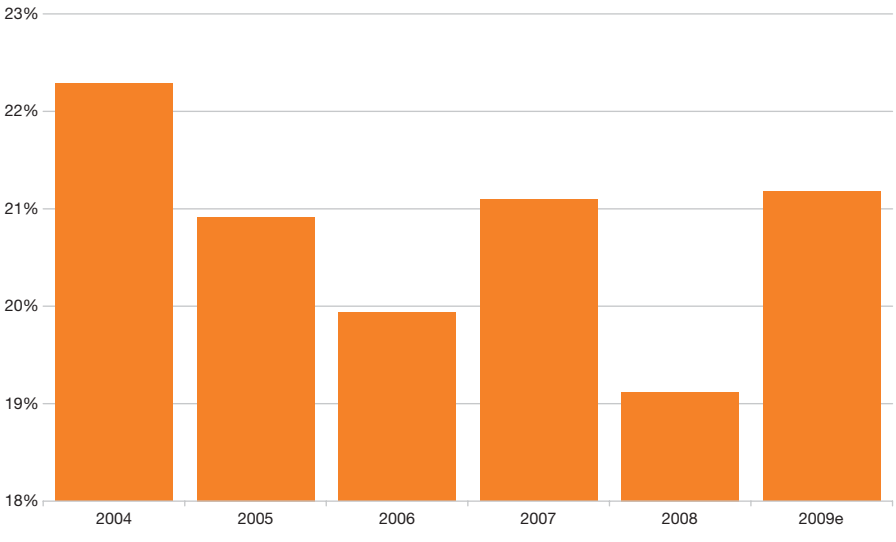
For all five companies, achieving these cost cutting targets (the equivalent of 11% of aggregate EBITDA in 2008) would translate into a two point increase in the EBITDA margin, bringing it back to the 2007 level.

Table 14.2 Electricity Utilities' revenue growth (unit for every €100m in revenues) and volumes sold (TWh)



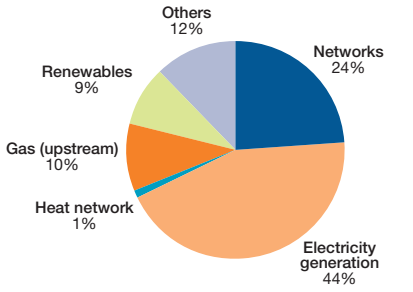
Source: SG Equity Research – Capgemini analysis, EEMO11

Table 14.3 EBITDA margin evolution



Source: SG Equity Research – Capgemini analysis, EEMO11

Table 14.4 Breakdown of investments by segment in 2008



Source: SG Equity Research – Capgemini analysis, EEMO11

In 2008, companies continued to invest massively in the cycle initiated in 2005. Most investments are being made in the electricity segment

Cumulated investments made by companies in the sector reached €120 billion in 2008. The power generation sector (excluding renewable energy) captured 44% of these investments (see Table 14.4), which were made in building new production facilities and improving existing facilities, while networks (electric and gas TSOs and DNOs) absorbed 24% of the investments, which were made in maintenance and network expansion.

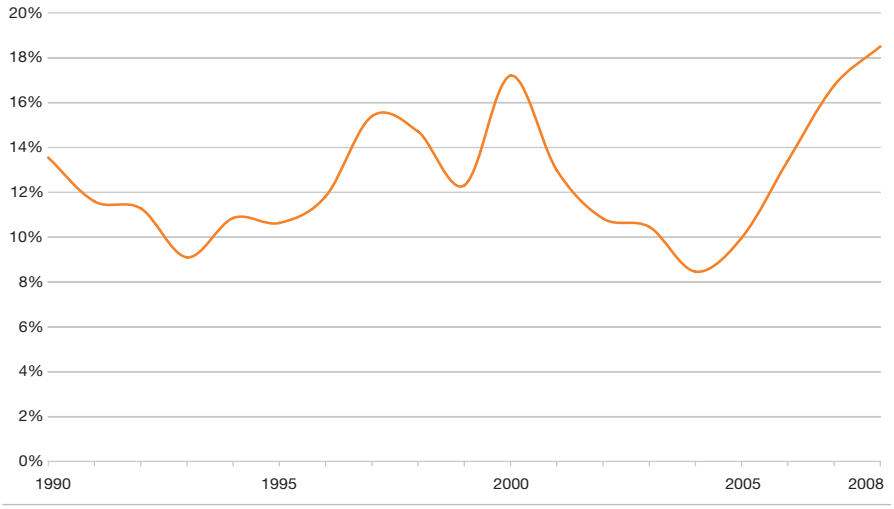
The level of investments made set a record in both absolute and relative terms. We have compared the investments made with corporate revenues. The CAPEX to revenues ratio reached 18.5% in 2008 (versus 16.8% in 2007 – see Table 14.5).

At this stage, we expect the level of investments to stabilize starting in 2009. The financial crisis and the problems in obtaining financing, together with the decrease in demand that has emerged mainly in 2009, should lead some projects, particularly those in the power generation segment, to be cancelled or postponed.

Note that companies will increasingly be faced with a resumption of nuclear investments starting in 2012, with the renewed acceptance of this type of production by many EU Member States. The construction of an EPR nuclear reactor would require an investment of approximately €5 billion (over four to six years), which would probably raise significant financing concerns after 2012.

French group EDF, together with GDF SUEZ, RWE, E.ON, Enel and PGE, should be first in line to benefit from this nuclear revival. In particular the German companies have formed partnerships to put together the financing needed to build new nuclear plants in the UK.

Table 14.5 Capex to revenues ratio (1990-2008)



Source: SG Equity Research – Capgemini analysis, EEMO11

Table 14.6 Utilities sector performance versus DJ EuroStoxx 50 (base 1 on January 1, 1995)

Source: SG Equity Research – Capgemini analysis, EEMO11

The sector's performance has been negative since the beginning of 2009, due to the impact of the crisis at the end of 2008 and the fall in consumption combined with a decline in prices

Up until December 31, 2008 the sector's performance relative to the stock market was positive (around 14% in 2008 – see Table 14.6 prior to 2009), reflecting the confidence of investors in its long-term strategy, strong visibility, balance sheets that were deemed healthy and cost reductions.

2009 has been a lot less satisfactory (see Table 14.7), with the sector posting a significant underperformance and bottoming out in the first week of August (-23%), after which a recovery movement seems to have begun.

The origins of this underperformance are to be found in the consumption trends, with a 5.1% decline in electricity consumption (overall in Spain, France, the UK, Italy, Belgium, Denmark, Portugal, Austria, Greece and Poland) and a 8.7% decline in gas consumption (overall in France, Spain, the UK, Portugal, the Netherlands, Czech Republic, Austria, Italy and Germany) in H1 2009 (versus

H1 2008)[29]. In both gas and electricity, the declines began in Q1 2009 and were associated with a fall in prices leading to a decline in revenues.

In the first instance the market did not appear to judge these declines as significant. In our view, it was their acceleration that triggered a sell-off of the sector. The theory that Utilities was a defensive sector was quashed.

This change in perception occurred as a number of major mergers and acquisitions operations were finalized and a credit crunch was hanging in the air. The sector found itself caught between a drop in volumes and a perceived financing risk.

Sector company valuations have significantly deteriorated since the beginning of the decade

The sector is currently trading on 12.3x 2009e earnings (see Table 14.8). This multiple (which represents the number of times an investor is prepared to pay company earnings, or share price/earnings per share) stood at 24.6x in 2001.

We note that sector yield (dividend/share price) was estimated at 5% in 2009, compared with 6.6% in 2008 and 4.6% in 2007. This is virtually identical to corporate bond yield (5.5%).

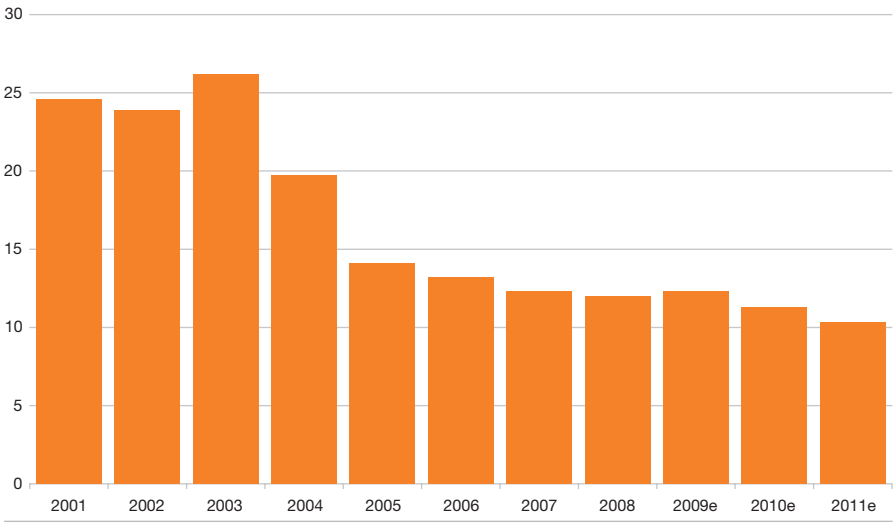
The main mergers and acquisitions carried out in the sector are estimated to have totaled more than €70 billion in 2008 (versus €150 billion in 2007). Although a number of medium-sized deals seem to be fuelling the market at present, no major operations appear to be planned for 2009

The acquisitions that have taken place since the start of 2008 have had two main aims: to reinforce generation capacities (acquisition of British Energy by EDF to reinforce nuclear production capacities, various acquisitions by RWE, acquisition of Nuon by Vattenfall) and to increase the client portfolio either in the domestic market or abroad (entry of RWE into the Dutch market through the acquisition of Essent, acquisition of Enel Endesa's Italian, Spanish and French activities by E.ON). Note also that the carbon footprint impact is part of Utilities' strategy. As RWE acquired Essent (which enjoys a significant presence in renewables), it focuses on acquiring CO_2-free generation capacities.

Table 14.7 Utilities sector performance versus DJ EuroStoxx 50 (base 1 on January 1, 2008)

Source: SG Equity Research – Capgemini analysis, EEMO11

Table 14.8 Utilities sector P/E (2001-2011e)



Source: SG Equity Research – Capgemini analysis, EEMO11

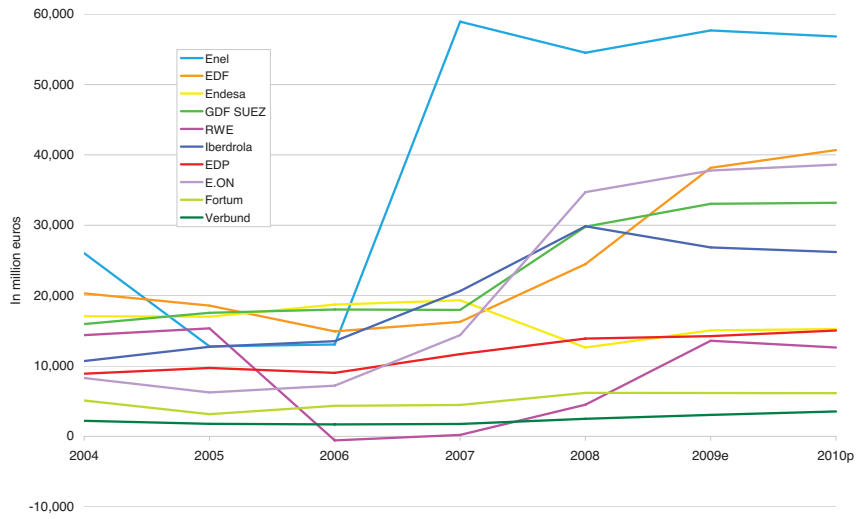
We list the amounts announced by the companies in 2008 (corrected for material currency impacts, £/€ in particular):

- Acquisition of British Energy by EDF (UK£12 billion/€13.5 billion);
- Sale of 20% of British Energy by EDF to Centrica (for around UK£2.1 billion/€2.3 billion);
- Acquisition of Endesa Italy, Enel Spain (Viesgo), 65% of E.ON France (formerly Snet) for €11.8 billion;
- Acquisition of 51% of Belgian company SPE (Société de Production d'Electricité) by EDF (€1.2 billion) from Centrica;

[29] Smart Energy Index of SG Equity Research

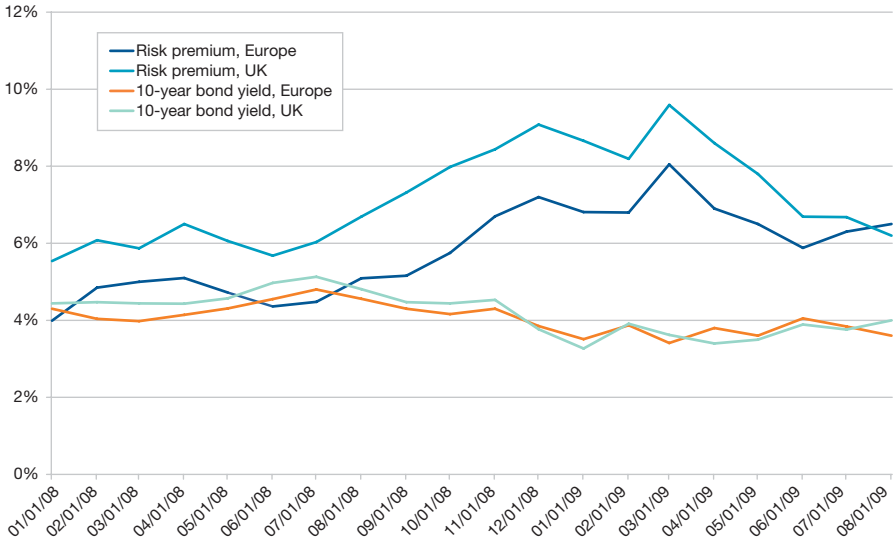
- Acquisition of EWE by EnBW (€2 billion);
- Acquisition of Union Fenosa by Gas Natural (€16.5 billion);
- Acquisition of East Energy by Iberdrola (US$4.5 billion/€3.1 billion);
- Finalization of the acquisition of Endesa by Enel (€11.1 billion);
- Disposal of Endesa's renewable energy assets to Accionna (€2.9 billion).

Table 14.9 Change in net debt for the ten largest European companies in the eurozone (net debt)



Source: SG Equity Research – Capgemini analysis, EEMO11

Table 14.10 Eurozone ten-year bonds versus European market risk premium



Source: SG Equity Research – Capgemini analysis, EEMO11

The total value of sector transactions more than halved in 2008 (versus 2007), as no "mega deal" (like GDF SUEZ for which the combined value of the two companies was €90 billion) was carried out.

The structures of the larger companies are now solidly defined. A certain amount of merger-acquisition activity is likely to continue over the coming quarters, especially what can be deemed medium-sized or small-scale operations in this sector (<€10-15 billion). One illustration is the likely acquisition of Polish company Enea by RWE for an estimated €1.5-1.7 billion (net value of the cash position of the target company).

Below we list the deals scheduled for 2009 (finalized or in the process of finalization):

- Acquisition of Essent by RWE (€7.3 billion);
- Acquisition of Nuon by Vattenfall (€8.5 billion);
- Acquisition of Stoggit and Italgas by Snam Rete Gas (€4.5 billion);
- Acquisition of Queensland Gas Comp. by BG Group (UK£2 billion/€2.2 billion);
- Acquisition (in progress) of Venture by Centrica (UK£1.2 billion/€1.3 billion);
- Acquisition (in progress) of VNG by EnBW (for an amount exceeding €1 billion);
- Disposal (under way) of Thüga by E.ON (€2.9 billion);
- Disposal (under way) of Wemag by Vattenfall Europe (€170 million);
- Sell-off of EDF Energy distribution arm (€4 billion expected);
- Additional sale (envisaged) of 20% of British Energy by EDF to a third shareholder.

The particularity of the 2009 financial crisis has been a lack of liquidity. Despite an increase in the cost of debt, companies have opted for bond financing which is still cheaper than making a call on the market (although these have not been excluded)

We have looked at two multiples: net debt/EBITDA and net debt/shareholders' equity (gearing). These two multiples stood at 2.6x and 81% respectively at the end of 2008.

Company debt continued to deteriorate in 2008, in comparison to the 2007 level. This trend follows a period of deterioration that began in 2006: the combined debt of the ten largest European companies rose by 113% between 2006

and 2008, to reach €213 billion (see Table 14.9).

In 2008 this negative trend was essentially attributable to acquisitions (by RWE, Enel, Iberdrola). However, we also note that some companies sold assets to reduce debt (Endesa, Enel, Iberdrola and E.ON).

Nevertheless, the financial community seems ready to accept a higher level of debt for certain companies in the energy sector, particularly regulated companies that enjoy very good visibility (as with Snam Rete Gas which carries a very heavy debt burden).

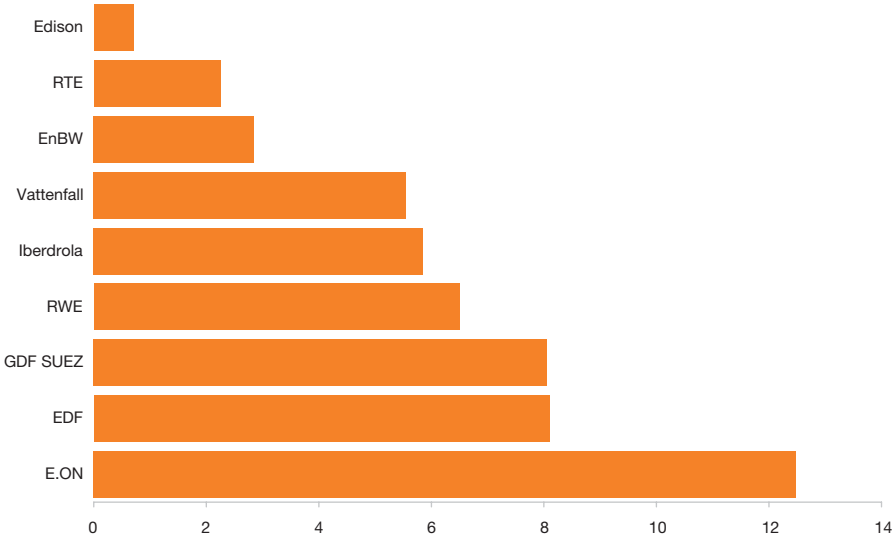
The increase in cost of debt affects all companies with almost no distinction based on size or business model. This increase is due to a rise in both the cost of borrowing (effect of the July 2008 crisis followed by the fall in interest rates linked to lack of growth) and the risk premium (impact of December 2008 crisis which has not yet fully subsided, as the premium is still 5.88% – see Table 14.10).

Companies carrying limited debt, such as GDF SUEZ (debt/equity of 47% in 2008) should recover more easily after the crisis as the banks are likely to grant them loans based on lower risk premiums (compared with companies like EDF where the same ratio stands at 144% for the same period).

At present, companies that are looking for financing tend to consider the following two sources:

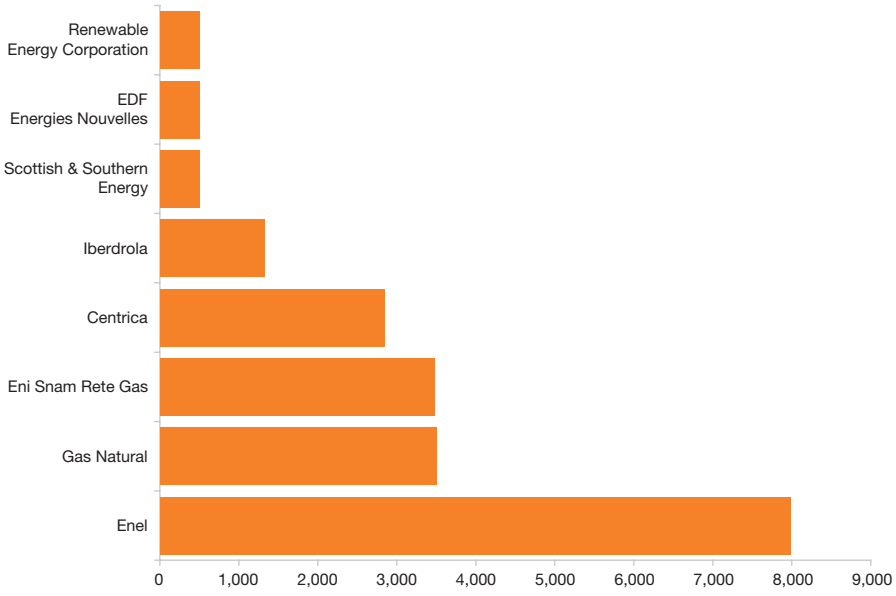
- Corporate bonds (total of €77 billion since January 1, 2008) with an average coupon of 5.25%: nine companies representing two thirds of the issues, or an amount in excess of €50 billion (see Table 14.11). E.ON has issued the most in nominal terms, with more than €12 billion, followed by EDF (€8 billion – excl. RTE > €2 billion) and GDF SUEZ (€8 billion). The large number of bond issues may seem surprising but sector companies have continued (as we had anticipated) to invest at a sustained pace. For the first time since the end of the 1980s EDF has issued a bond to the public;
- Capital increases with or without preferential subscription rights (total of €22 billion since January 1, 2008): 16 companies have made calls to the market. The largest operation was carried out by Enel (€7.98 billion – see Table 14.12).

Table 14.11 Amount issued in bonds, by company from January 1, 2008 to date (in € billion)



Source: SG Equity Research – Capgemini analysis, EEMO11

Table 14.12 The eight largest capital increases (in € million)



Source: SG Equity Research – Capgemini analysis, EEMO11

Glossary

ACER
Agency for the Cooperation of Energy Regulators, created under the EU Third Legislative Package.

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

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

AMM
Automated Meter Management. AMM is AMR plus complementary automated meter related services such as activation, change of authorized power. The device allows two-way communication between the meter and the operator of the metering solution.

Backwardation
See Contango.

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).

CAPEX
Capital Expenditure, funds used by a company to acquire or upgrade physical assets.

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

CCS
Carbon Capture and Storage. Technologies used 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.

CER
Certified Emission Reduction. Quotas issued for emission reductions from Clean Development Mechanism (CDM) project activities.

Churn
See Switching.

CHP
Combined Heat and Power (see Cogeneration).

Clean Coal
New technologies and processes allowing electricity generation from coal while lowering CO_2 emissions.

Clean Dark Spread
The difference between electricity's spot market price and the cost of electricity produced with coal plus the price of related carbon dioxide allowances.

Clean Spark Spread
The difference between electricity's spot market price and the cost of electricity produced with gas plus the price of related carbon dioxide allowances.

Clearing
Administrative and financial settlement of a contract.

Clearing house
Organisation in charge of clearing contracts on behalf of contractual parties. Generally a service offered by exchanges or banks.

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

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

Contango
"Contango" means that long-term prices are more expensive than short-term prices, depicting a relaxed short-term market, whereas "backwardation" reveals more tension in the short-term reflected in higher short-term prices than in the long-term.

Decentralised generation
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.

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. It may involve a small on-site generating plant or fuel cell technology.

C. Lewiner (ed.), *European Energy Markets Observatory*, DOI 10.1007/978-94-007-0101-4,
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DNO
Distribution Network Operator.

EBIT
Earnings Before Interest and Taxes. EBIT may also be called operating income i.e. the product of the company's industrial and commercial activities before its financing operations are taken into account. EBIT is a key ratio for gauging the financial performance of companies.

EBITDA
Earnings Before Interest, Taxes, Depreciation and Amortization. EBITDA is a key ratio for gauging the cash flow of companies.

EFET
European Federation of Energy Traders.

Eligible customer
Electricity or gas consumer authorized to turn to one or more electricity or gas suppliers of their choice.

ENTSO-E
European Network of Transmission System Operators for Electricity, created under the EU Third Legislative Package.

ENTSO-G
European Network of Transmission System Operators for Gas, created under the EU Third Legislative Package.

EPR
European Pressurized Reactor. Third generation of nuclear plant technology using advanced Pressurized Water Reactor (PWR).

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.

EUA
European Union Allowances. Quotas allocated by the National Allocation Plans in compliance with the European Trading Scheme.

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

European Commission (EC)
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 EU member states meet. Held at least twice a year, these meetings determine the major guidelines for the EU's future development.

European Parliament (EP)
The assembly of the representatives of the EU citizens.

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 release on the market a certain amount of gas for other players through call for tenders or bilateral negotiations.

GIE
Gas Infrastructure Europe. GIE is the association representing gas transmission companies (GTE), storage system operators (GSE) and LNG terminal operators (GLE) 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.

HHI
Herfindahl-Hirschman Index, a commonly accepted measure of market concentration. It is calculated by squaring the market share of each firm competing in a market, and then summing the resulting numbers. The HHI number can range from close to zero to 10,000.

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.

IPCC
Intergovernmental Panel on Climate Change, the leading body for the assessment of climate change, established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) to provide a clear scientific view on the current state of climate change and its potential environmental and socio-economic consequences.

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 6 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 is mainly 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 minimizes 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.

NIEPI
Number of Equivalent Interruptions per Power Installed, i.e. number of interruptions in relation to the installed capacity in low / medium voltage.

Nomination
A request for a physical quantity of gas under a specific purchase or transportation agreement.

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.

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.

OPEC
Organization of the Petroleum Exporting Countries.

Open season
A period (often one month) when a pipeline operator accepts offering 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 operator will refine the proposal and prepare an application for construction before the appropriate regulatory body for approval.

OPEX
Operational Expenditure, expenditures that a business incurs as a result of performing its normal business operations.

OTC
Over The Counter (see bilateral contracts).

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.

P/E
Price / Earning ratio. The ratio of the share price to the Earning per share (EPS). P/E ratio is one of the tools most commonly used for valuing a company share.

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.

RPI-X
An approach to regulating prices under which the regulated company is allowed to adjust its own prices subject to the weighted average of prices not exceeding

a cap. In the RPI-X price cap system this cap is allowed to increase at the rate of inflation (RPI) less some "X factor" to account for productivity gains or to reduce the regulated firm's rents.

SAIDI
System Average Interruption Duration Index, SAIDI is the average duration of interruptions per consumers during the year. It is the ratio of the annual duration of interruptions (sustained) to the number of consumers. If duration is specified in minutes, SAIDI is given as consumer minutes.

SAIFI
System Average Interruption Frequency Index, SAIFI is the average number of sustained interruptions per consumer during the year. It is the ratio of the annual number of interruptions to the number of consumers.

Shippers
The party who contracts with a pipeline operator 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 in 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.

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.

TIEPI
Time of Equivalent Interruption per Power Installed, i.e. quality of service index based on interruption duration in relation to the installed power in low and medium voltage.

TPA
Third Party Access. Recognized right of each user (eligible customer, distributor, and producer) to access in a non-discriminatory and efficient manner 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 organisation of network coordination gathering network operators.

UGS
Underground Gas Storage.

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

UNEP
United Nations Environment Program.

VPP
Virtual Power Plant, fictional production capacity, non-designated, sold to an operator through auctions 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: http://www.bwb.gv.at/
Belgium	BE	CREG CWAPE (Walloon) VREG (Flanders)	Ministry of Economic Affairs: http://economie.fgov.be/en/
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	Energy Agency: 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.developpement-durable.gouv.fr/energie/ Ministry of Ecology, Energy and Sustainable Development: www.developpement-durable.gouv.fr/ Ministry of Economics, Finance and Employment: www.minefe.gouv.fr/
Germany	DE	BNetzA	Federal Environmental Ministry: www.bmu.de/ Energy Agency: www.dena.de/ Competition Authority: www.bundeskartellamt.de/
Greece	GR	RAE	Ministry of Development: www.ypan.gr/ Ministry of Environment: www.minenv.gr/ Competition Commission: www.epant.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.ilnas.public.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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