

THE CONVERGENCE OF ELECTRIC POWER AND NATURAL GAS UTILITIES IN THE UNITED STATES : WHICH LESSONS FOR EUROPE ?.

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The views presented in this paper can be referred only to author who is sole responsible for them.

ABSTRACT

The word 'convergence' of natural gas and electricity industries is progressively used at least in North America and currently in Europe. In the United States, the meshing of these two value chains has resulted of deregulation reforms and technological advances. It has obvious implications on the whole energy industry organization : emergence of an integrated market and merger wave. In this paper, we will focus on convergence of electric power and gas utilities. We will wonder which lessons of the American energy industry experience can be useful for the current European market evolution.

INTRODUCTION

Worldwide, energy networks industries are undergoing a transition from regulated to competitive markets. After restructuring reforms in the transportation and telecom sectors, deregulatory initiatives have been taken in natural gas and electric power industries to eliminate traditional constraints and protectionism. A new era has begun : in some segment of value chains, monopoly activities are now open to competition. The pace of liberalization and the route towards it geographically varies. The European electric power industry is in its early stages of transition towards a competitive electric market. In the United States, for the last two decades, electric and natural gas industries have progressively experienced major changes in terms of organization and competitiveness. All over the world, the move seems to speed up.

The word '**convergence**' of **natural gas and electricity industries** is progressively used at least in North America and currently in Europe. The deregulation process and technological changes are inducing growing links between these two energy value chains. This phenomenon is obvious with the **wave of mergers and acquisitions** among American electric power and gas utilities, and it tends to invade Europe. These corporate operations are seen as strategic combinations of assets, skills and markets to form an 'energy company', competent in various energy activities. Within ten years, the electric power sector, as we know it in Europe, will cease to exist. It is still unclear what kind of industry will emerge from this period of transition. The meshing of electric and gas value chains seems to be highly relevant to study in the era of changes in Europe. There are lively discussions about how the American experience of electric power sector could be used.

In this paper, we will focus on a specific characteristic of the emerging competitive energy markets : the **convergence of electric power and gas utilities**. To begin with, we will present the **main drivers** of the

growing link of gas and electricity industries in the United States. Then, we will analyze **several impacts** of the convergence of electric-gas value chains on the new American energy market organization. Finally, we will wonder which **lessons of the American experience** can be helpful for the current European market evolution.

MAIN DRIVERS OF GAS-ELECTRICITY CONVERGENCE IN THE UNITED STATES.

In the United States, the electricity industry, likely the most stable structure in terms of growth forecasts and rates stability is about to experience a major upheaval. The vertically integrated monopoly suppliers of power services are quickly becoming an image of the past (P.JOSKOW 1997). For the last two decades, the electric utility industry has undergone a progressive transformation from a regulated market place to one exposed to the influence of market forces. Since the beginning of the 90ies, a "new age of competition" has begun : many states, through their regulators, are considering various initiatives of increased wholesale competition for power generation and even direct access to retail customers¹ (T.BRENNAN 1996). The power generation function will be driven primarily by cost minimization considerations. Transmission is likely to assume regulated common carrier status. And local distribution companies will emerge as full energy services suppliers. Since last year, some states (California, Massachusetts, Pennsylvania,...) have programs that separate transmission activity and allow retail consumers to choose among several generation service suppliers(E.BAILEY 1998).

With the liberalization reforms, the creation of more efficient markets and price transparency is inducing the meshing of both gas and electricity supply chains. Technological innovations combined with a growing demand for commercial choices are accelerating this movement. More precisely, the **main drivers** of this convergence have been :

- **Ongoing deregulation** of the gas and electricity markets.

The greatest parallel between the two industries is probably in the area of regulation. Begun at the same period², their regulatory histories are closely intertwined. Both sectors are generally regulated by the same commission which creates a natural tendency to converge of regulation. This is perhaps not surprising considering the many similarities between the electric power and gas industries³. F.E.R.C.'s (Federal Energy Regulatory Agency) recent restructuring of the electric power industry is based on the precedent model of the gas industry. There is already a form of deregulatory convergence between electricity and natural gas at federal level. The F.E.R.C. Order 889 in the electric industry, for example, mirrors its earlier Order 636 in the gas industry. This parallel trend seems to continue at the state level with progress towards retail competition. Moreover, the process of unbundling energy utility business is facilitating the link along both value chains. By separating energy activities and liberalizing some of them, utilities are allowed to go beyond their markets to penetrate others. The opening to competition reforms appear necessary but not sufficient to electricity-gas convergence (M.JESS E.I.A. 1998).

- **Upstream linkage** of gas and power generation.

Technological progress, regulatory factors and environmental concerns combined to encourage the use of natural gas for power generation. Advances in turbine efficiency have been made in the last decades with some combined-cycle gas turbine (C.G.T.) units now capable of achieving 65-75% efficiency compared to the 35 % efficiency for coal fired plants. Low polluting and less capital risked, C.G.T. units are more efficient method of producing electricity than traditional coal plants. Recent innovations in power generation have resulted in the emergence of so-called "distributed generation" units. This is a term for a diverse group of technologies⁴ aimed at generating electricity close to the place where it is used instead of generating at large centralized power plants and transmitting the power to users over long stretches of

wire. The latest distributed generation options is gas microturbines. Small, flexible, environmentally clean, and relative maintenance free, gas microturbines can compete favorably with traditional units at the current low prices of natural gas. With environmental protection decisions, a few recently improved and new technologies based upon natural gas will pay important roles in competitive power generation strategies.

- **Midstream synergies** between gas-power trading and risk management.

Technology advances are transforming the perception of electricity towards a commodity as it has occurred in the gas sector. The commoditisation refers to the move in both gas and electricity away from long term fixed price contracts to contracts based on spot process or some other market-related price. Gas and electricity are now considered as two commodities with a physical spot market⁵ and a 'financial paper' market. With the emergence of electric spot markets, energy buyers and sellers have become exposed to financial risk caused by volatile spot prices. This has led to the development of derivatives markets and the entrance of a wide range of traders and risk management providers. The introduction of NYMEX electricity futures has raised possibility of trading spreads between gas and electricity futures. Last year, nine of the top-ten US based power marketers have originated from the gas sector.

- **Downstream opportunities** to eliminate duplication costs.

In the United States, combined distribution utilities of gas and electricity have always existed. With the deregulation of power retail function, an increasing number of utilities are now combining their gas and electricity marketing activities to offer consumers a bundled energy service as one package. They are testing new technologies : on-line billing, remote appliance scheduling and control, and energy-usage monitoring. Significant synergies are perceived as offering customers a one-stop-shop energy services (similar to the approach of supermarkets to food retailing). Some utilities are trying to leverage their customer relationship to cross-sell products and services⁶ like water delivery, telecom, technical advice, home-security systems and electrical appliance maintenance contracts.

The meshing of gas and electricity industries have resulted of the liberalization reforms towards competitive power generation and retail sectors, and the powerful disruptive effects of technological changes. Deregulation combined with important innovations have induced growing link between these two energy value chains at different levels of activity. The convergence is breaking over the electric power industry organization, sweeping away traditional utility structures and creating new business opportunities in an increasingly competitive market environment.

IMPACTS OF THE CONVERGENCE ON THE AMERICAN ENERGY MARKET

In the United States, the move towards convergence have been primarily driven by a need to reduce costs and to take advantage of the various synergies that might occur between electric and gas businesses. The American electric power and gas industries are clearly connected along deregulated segments :

- In **power generation**, the use of natural gas is leading to the emergence of a new market place where gas and electricity will be sold together and compete together.

Many energy utilities view convergence as a means of managing commodity price volatility, by providing them with the opportunity to arbitrage⁷ between the various commodities and their respective markets. A number of players are seeking deliberate convergence of gas and electricity trading. This is generally motivated by intention of cutting costs by combining trading operations and exploiting arbitrage opportunities. Of particular importance to the convergence of the gas and electricity industries, is the development of arbitrage related use of gas-fired power generating units. Over 200 new entrants have filed

the necessary paperwork to become power marketers including potentially powerful players such as major oil companies (e.g. *Amoco*), gas marketers (e.g. *Enron*), and Wall Street firms (e.g. *Morgan Stanley*). As might be expected, players who are now entering the commodity marketing-trading game position themselves with either financial or physical dimensions (if not both). At present, the United States offers the most developed gas-electricity arbitrage worldwide⁸. However, exploitation of arbitrages still varies from region to region due to differences in the structure of markets and trading mechanisms.

Furthermore, with technological advances and the loss of significant economies of scale in production, a new generation market has emerging and is about to revolutionize the electric power industry's organization (C.BAYLESS 1994). These new generating systems can do more than reduce the costs of electricity. Distributed generation units have changed the fundamental premise that shaped electricity systems for more than a century. The long trend of large expensive central power plants which take years to build, require miles of distribution wires and take decades to pay off (see the discussions on stranded costs) is replaced by new highly efficient distributed generation units closer to end users⁹. The optimism regarding microturbines may be premature because they still have to be commercially proven. However, they have frightened some traditional utilities accused of suppressing researches and strategically delaying deployment of distributed generation (B.ALTHOUSE 1999).

- **Energy retailing** will continue to see increased competition with consumers having a greater choice of suppliers.

"Beyond the meter" is a widely used sentence in the literature to describe business opportunities that may provide customers with greater services. The convergence of the electricity and gas value chains in the marketing-supply segment has led companies to offer both fuels, till to become home services providers. In an effort to add value, many energy suppliers are seeking to decommo-ditise electricity : they are providing 'value-added' services to attempt to increase their margins. Energy companies, using the same infrastructure to deliver energy, are looking for differentiating themselves on the basis of service. Three basic models of energy supply retailer have emerged : basic company supplying gas and/or electricity with few added services ; combined energy company offering a total energy package ; and a multi-utility services for customers. As the market for energy services evolves, utilities need to make careful strategic choices on paths to follow in attempting to build a distinctive value proposition for customers they wish to target in the long run.

The much-talked-about convergence of electric power and gas industries is continuing, pushing toward an increasingly integrated energy market. The United States are moving from an electron and molecule energy system to a **BTU's one** (the BTU is the British thermal unit of heat formerly used in the UK and currently used worldwide in many gas and power projects). Electricity and gas markets are disappearing with the emergence of the BTU market where it would be possible to buy and sell energy units (with or without owning electric assets). Players could make arbitrage : geographic arbitrage, commodity arbitrage and grade arbitrage. Energy companies are looking to "enhance the value of the BTU" by becoming the least costs energy supplier and enhancing the convenience of the commodity with services beyond the meter. They are looking beyond the confines of the segments of the value chain in which they operate to form links with end-users via companies in others segments.

Since 1992, a **wave of large electricity and gas mergers** has arisen. The merger mania in the United States is impressive : if the hunt goes on, half of the main actors, the Investor Owned Utilities (IOUs), could disappear in the next years. To survive in this new competitive environment, power companies are seeking partners to join forces : they naturally looked for gas companies to exploit synergies. Numerous merger, acquisition and joint venture activities between the electric power and natural gas industries have

occurred : *Houston Industries / NorAm Energy, Enron / Portland General Electric, Duke Power / PanEnergy, Puget / Washington Energy Texas Utilities Corporation / Enserch...*). Where the gas and electricity markets have been exposed to competition, the profit margins have been progressively eroded. Consequently, most gas and electricity utilities see a need to minimize costs and take advantage of the economies of scope and scale¹⁰ provided by convergence strategies.

According to the E.I.A. energy industry combinations include : 1/electric utilities acquiring pipelines, local distribution companies and coal mines 2/major oil companies acquiring midstream natural gas and electric generating assets, 3/pipelines acquiring electric utilities and independent power producers, 4/pipelines acquiring gatherers, processors and marketers, and other pipelines. For example, with gas now chosen by many electricity generators as their first choice as fuel, many electricity companies begin to take an active interest in the gas companies from which they purchase their fuel. And reciprocally, there is significant vertical integration with electricity utilities owning generating capacities and gas distribution companies owning upstream assets. In the supply activity, the ability to market both gas and electricity using the same infrastructure and branding by offering a total energy package, has provided a strong reason for many gas and electric companies to horizontally merge. The strategy of merging two separate energy commodity businesses (gas and electricity), to form a single business focused at providing a comprehensive energy service to all users (both wholesale and retail), is a prevalent strategy of important companies in the United States today. The concept behind these megamergers is to create global energy companies rather than specifically gas or electric utilities.

Merger activity in the United States has involved the regulatory agencies : ensuring that consumers benefit from the savings derived from any operation, that there will be an adequate supply of information for regulatory purpose post-merger and, most important, that there will be no market distortions resulting from the merger (P.JOSKOW 1999 in J.E KWOKA Jr). We can wonder if this move towards larger and larger utilities will ultimately be to the detriment of customer choice and true competition.

LESSONS FOR THE EUROPEAN ENERGY MARKET

With the move toward deregulation, electricity and gas value chains convergence is coming to Europe **more slowly** than in the United States. Creation of a single European energy market is inevitable with European law requiring it. An unstoppable tidal needs to reduce prices ; triggered by both the European Union Electricity Directive and technological innovation, it is now in motion, transforming the industry and the company serving it. The Electricity Directive will fragment the traditional industry structure and provoke a complete reorganization. Competition has been driven into a traditionally monopolistic market, appearing first in the more receptive generation and supply segments. In February 1999, European Community¹¹ member states had to open up a minimum of their market (see Table 1). The Electricity Directive will restructure the industry by forcing EU member countries to increase transparency and "unbundle" their integrated monopolies. It was introduced to reduce electricity prices in Europe, through market liberalization, forcing a shift in economic thinking from a monopolistic to a free market approach (JM. CHEVALIER 1997). The gradual liberalization process in Europe is finally accelerated even if till now the situation is different from one an other country¹². Convergence activity will pick up : most near-term activities are likely to take place in the UK, Spain and Nordic countries whereas other markets are likely to be attractive in the medium term.

Table 1 : Requirements for market opening under the European Electricity Directive.

19/02/1999	Minimum market opening calculated by the share of total electricity consumed by final consumers with annual consumption > 40 GWh (covers roughly 25% of the EU as a whole)
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19/02/2000	Threshold lowered to >20 GWh (implied market opening of 28%)
19/02/2003	Threshold lowered to > 9 GWh (implied market opening of 33%)
19/02/2006	Directive will be reviewed, full competition envisaged thereafter (as in the UK, Finland, Sweden and Norway)

Source : Rider G. (1999)

While some comparisons can be drawn with the American federal electricity market, there are more differences than similarities. While 250 potential players are counted in the new liberalized US market, the number of European players is restricted because of the traditional dominance of national monopolies. The reaction of the main European electric utilities to deregulation has been twofold : to protect their home markets and simultaneously to seek specialized opportunities out of their core business. Forming all type of alliances either between themselves or with other companies, power utilities have developed links with gas companies to control the entry into their industry (*Shell Electricity Company, Iberdrola / Repsol, ...*).

Across Europe like in the United states, the electricity and gas industries will converge significantly at different levels of operations. Technological advances, economic considerations and environmental concerns are combined to change European electric power generation (as it is the case in North America). There have been numerous examples of utilities partnerships to build new cogeneration plants across Europe (*Total - EDF* in Normandy). Public resistance on environmental grounds to construction of large power plants or high voltage grid lines, and technological generation advances make it easier for new players to enter the generation market. The use of natural gas in generation is also growing across Europe. The European Community has projected 18% of electricity generation to come from cogeneration by the year 2015¹³. At present, gas-electricity arbitrage has not developed in Europe due to the lack of spot markets, and therefore, reliable prices index in most of the European gas and electricity markets. In retail supply, pooling customer management capabilities, leveraging economies of scale and scope, and bundling of energy services will allow suppliers to improve their margins and get closer to their customers.

Unlike North America, in Europe, the gas market is not a real driving factor for more competitive electricity market because it has not yet been liberalized. The growth of gas in power generation and environment concerns, will define the single European market¹⁴. American electric utilities have focused mainly on gas upstream supply, midstream expertise and downstream synergies. The positioning of European power firms in gas sector differs :

- Multi services strategies exploding in Europe (*Vivendi, Lyonnaise des Eaux ...*)
- Rare multi utilities except in the UK (*United Utilities, Hyder and Scottish Power*)
- Diversification with a position in upstream oil and gas or integrated gas (*RWE, Veba...*)
- Generation or supply oriented with dedicated reserves (*PowerGen, National Power...*)

These degrees of participation have been determined more by historical factors than by a view to the future.

The experience in the UK and the Nordic region, where deregulation efforts began nearly a decade ago, provides clues as to what it might happen across Europe. Eight of the UK's 12 regional electricity companies were taken over by US companies early in the deregulation process (since many of them are selling out of the Britain market). In the UK, re-integration is emerging in new deals with Powergen - East Midlands, Southern Electric Scottish Hydro and Scottish Power - Pacificorp. This move of consolidation will create difficulties for regulators in monitoring the sector. As competition intensifies, vigilant enforcement of antitrust laws will be essential for the preservation of an open competitive industry. In the United States, utilities supplying both energy commodities are not uncommon and this is reflected in the regulatory regimes with joint state committees. The possibility of a common European regulator is currently under discussion. There is a clearly challenge that the regulators will need to rise to, or their

credibility will diminish both in eyes of the company they are seeking to regulate and in the eyes of the consumer they are seeking to protect.

CONCLUSION

The energy utility sector is undergoing a fundamental transformation around the world as markets are deregulated and governments owning utilities are privatized. The European electricity landscape continues to be characterized by diversity rather than uniformity. Some markets will be liberalized faster than others while still retaining their national differences. There is still considerable resistance from the existing incumbent monopolies, and a firm degree of ignorance from many end-users who are unaware of the potential savings that competition might bring to their energy costs. However, a shock in the European energy markets is beginning to appear as more customers seek to below their energy costs¹⁵ with access to cheap sources of gas and electricity.

In the United States, the value chains for gas and electricity supply are becoming meshed together as a result of the deregulation process and technology changes. As competition has intensified in both electricity and gas value chains, it has become noticeable that all parties are seeking to develop market shares in both industries by making use of benefits of synergies between the two markets. Convergence is more than simply the integration of common gas and electricity business processes to form one entity. It involves : exploiting and sharing common activities to reduce costs, as well as exploiting synergies and substitutability at each end of the value chain (wholesaling and retailing). The development of competition clearly provides progressively thinner profit margins. Some U.S. utilities believe that is a case of "converge or die". And it is coming to Europe¹⁶ where changes are accelerated thanks to utilities strategies.

Traditional energy industry's organization is altered by nimble competitors, new technology and freely traded energy. A number of players from the US and some liberalized European countries are seeking ways to gain a physical presence in Continental Europe, should the circumstances allow it. As G.RIDER (1999 pp.19) underlines "*the slowest to move are often the first to fall*". Established companies have to adapt quickly if they want to survive. The "energy company" has emerged. A good illustration is Enron's vision to become the "*world's leading energy company*" where the focal point is gas and electricity convergence.

In European Community like in North America, while there has always been competition it is only now in the deregulated energy markets that gas and electricity can be traded interchangeably : the competition is becoming inter and infra energies. History is repeating itself : emerging global market is coming back to the old structure vertically integrated (along different value chains) and concentrated (see the merger mania).

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FOOT NOTES

¹ The changes are designed to foster competition in the power generating segment and to reform regulation of the transmission and distribution functions, which continue to be viewed as natural monopolies.

² Federal regulation of both industries was established when the Federal power Act and the Natural Gas Act were incorporated in the Public utility Holding Company Act in 1935.

³ However, although demand for gas and electricity is reasonably well correlated there are significant physical differences between the two commodities.

⁴ Some of the technologies that can be placed near users include microturbine generators, windmills, solar cells, photovoltaic and fuel cells

⁵ The emergence of spot markets has been the result of regulatory reforms and the introduction of competition into markets which were formerly monopolies. Emerging spot markets are largely physical, they serve as a market in which to trade a commodity for physical delivery.

⁶ Different services : energy management, metering, cleaning services, maintenance, water delivery, computer services, home security, broadcast, telecom, cable TV...

⁷ Arbitrage is the difference in price between related markets; either markets for a given commodity traded in different locations, or markets for two different commodities that can in some way substitute each other.

⁸ At present, only spot markets for either gas or electricity in Europe are in Scandinavia, and in Great Britain. Several countries are working on spot market projects (Spain, Netherlands, Germany...)

⁹ See Cooksey J. (1998), Linden H. (1997), Zuckerman L. (1997)....

¹⁰ "*Economies of scale may be defined initially as those that result when the increased size of a single operating unit producing or distributing a single product reduces the unit cost of production or distribution...* Economies of scope are those resulting from the use of processes within single operating unit to produce or distribute more than one product." A. Chandler Jr (1990) *Scale and Scope*, Harvard University Press. pp17

¹¹ The term European Community derives from the Treaty of Rome 1957, as amended by the Treaty on European Unity in 1992. The fifteen countries are members to the European Community which in turn forms part of the European Union, which was created by the 1992 Treaty.

¹² About European discussions : Chevalier JM. (1996), Hancher L. (1997), Bouttes JP. (1998), Baudru D. & Rigamonti E; (1998), Percebois J. & Nyouki E. (1998)...

¹³ Some countries have already exceed this target, such as the Netherlands, where cogeneration accounts for 40% of generation.

¹⁴ A trans-European gas network is being created with E.U. sponsorship to ensure security of supply.

¹⁵ To ensure industrial competitiveness, end users prices have to come down across the E.U. , where they are average 70% higher than in the US.

¹⁶ Convergence is beginning to occur in many countries throughout the world, although the main locations where it is beginning to have a significant effect are the US and the UK where the development of the competitive markets has promoted an impetus for the convergence of these industries.