



BORDEAUX ENERGY COLLOQUIUM

2006 – ENERGY MARKETS EVOLUTION: 25 YEAR
RETROSPECTIVE

**Le Grand Expérience de l'électricité et du gaz naturel:
Le parallélisme entre l'Ancien Régime et le Nouveau Paradigme¹**

by

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Ph.D.² Presented at the 2006 Bordeaux Energy
Colloquium Cap Ferret, France
September 14-17, 2006**

Abstract

A Grand Experiment is underway in electricity and natural gas. Operating side-by-side in each of the two great North Atlantic federal systems, North America and Europe, are two models for organizing and regulating the electric and natural gas industries. The restructuring of these industries that first took shape in the mid-1980s has been gradual and incomplete. A New Paradigm of competition is distinguished from the Old Regime of vertical monopoly by the ability of individual customers to arrange energy supplies under contract terms fitting their needs and to hedge prices in the market. Jurisdictional tensions inherent in federal systems explain the emergence of a quasi-experimental design that presents the opportunity to measure the relative performance of the traditional utility regulatory scheme and of the new model of competition and customer choice.

¹ "The Grand Experiment in Electricity and Natural Gas: Parallelism between the Old Regime and the New Paradigm."

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The Grand Experiment

Less by design than by happenstance, North America and the European Union have jointly entered into a Grand Experiment. Operating in parallel within these two enormous, essentially federal political economies³ are two quite different approaches to configuring markets for electricity and natural gas.

One approach is the familiar Old Regime that operated throughout most of the twentieth century. The prices and terms of service of investor-owned or government controlled vertically-integrated monopoly utilities are set or approved by government administrators. The rate setting is supposed to be attentive to balancing fairness and affordability for customers with a fair opportunity for utilities to earn their cost of capital.

The other approach, developed since the early 1980s, is predicated on a mix of regulation and competition that relies on supply and demand dynamics to set energy commodity prices while continuing to regulate the wires delivery segment as a natural monopoly. This New Paradigm assures end-use customers the right to choose their energy commodity suppliers and to hedge prices in the market. An added dimension to this liberalization has been massive restructuring in the form of mergers and acquisitions and, in a number of European countries, the transfer of generation and delivery assets from government to investor ownership.

Two decades of piecemeal policy choices and gradual implementation of general policy directives have produced a quasi-experimental situation in which we can observe and evaluate the relative performance of two alternative modes of organizing the electric and gas businesses. This construct is the result of the intersection of global economic and technological forces with democratic politics as mediated through federal governmental arrangements.

³ For the purposes of this paper, we will assert that North America (Canada and the United States) and the European Union (both old and new members) operate as two federal systems in which certain decisions in energy markets (mainly at the wholesale and bulk transport level) are taken by a central body while other decisions (mainly in the realm of trade and pricing at retail) are taken by individual member jurisdictions (U.S. states, Canadian provinces and European Union member nation states). This formulation recognizes that EU directives on retail gas and electric liberalization have been disparately implemented by member states. Thus, there are two separate, fairly well-integrated electric and gas markets in which explicit policy decisions have been made to employ competition in electricity and gas at wholesale and in which open access and price regulation at retail have, in practical terms, resided with “subsidiary” sovereign and semi-sovereign jurisdictions.

One of the tenets of policy development within the U.S. federal system, and by extension to Canada and the EU, was articulated by U.S. Supreme Court Justice Louis Brandeis in 1932.

*It is one of the happy incidents of the federal system that a single courageous state may, if its citizens choose, serve as a laboratory; and try novel social and economic experiments without risk to the rest of the country.*⁴

A federal system, *de jure* in the U.S and Canada and incipiently *de facto* in Europe as the European Community evolved into the European Union, sets up ongoing jurisdictional tensions that produce both new ideas and varying paces of adoption. Some ideas may emerge and take hold in a few jurisdictions but eventually fade away. Other ideas, however, may eventually be adopted by most or all jurisdictions. In other cases, there may be a semi-permanent bifurcation. Either way, this provides reason to expect that the Old Regime and the New Paradigm will operate side-by-side for some time to come. Those of us who have so far successfully advocated the movement toward competition cannot accept as a foregone conclusion eventual universal adoption in North America and Europe.⁵

Unraveling of the Railroad Paradigm

The traditional paradigm for the organization and regulation of the electricity and natural gas industries did not spring fully grown, Athena-like, from the head of The Great Regulator. Instead, cost-based regulation of franchised utilities represented a logical extension of the railroad model. Railroad regulation was meant to prevent “ruinous competition” in a high

⁴ U.S. Supreme Court, *NEW STATE ICE CO. v. LIEBMANN*, 285 U.S. 262 (1932), 285 U.S. 262 No. 463. Argued Feb. 19, 1932. Decided March 21, 1932. Interestingly, Brandeis’ much-quoted formulation was part of his dissent against the majority’s decision invalidating the effort by the State of Oklahoma to regulate the business of ice-making as a public utility. Brandeis, though arguing in favor of permitting such regulation, provides the rationale for de-regulation by “subsidiary” sovereign jurisdictions as well.

⁵ A scholarly analysis and lament on this point is presented by Jean-Michel Glachant and François Lévêque in their September 2005 paper “Electricity Internal Markets in the European Union: What to Do Next?” as part of the SESSA project of the Center for Energy Policy and Research. Glachant and Lévêque identify specific shortcoming in EU member states with respect to implementing electric competition policy directives and offer a set of primary and secondary actions to remedy the situation.

capital, low incremental cost business. In turn, it was applied to telegraph, telephone, trucking, airlines, long haul bus service and even taxi-cabs.⁶

It can be unkindly argued that the extension of the railroad model to a host of other industries was an unimaginative convenience explained by the shibboleth that “if all you have is a hammer, everything looks like a nail.” However, in the late 19th and early to mid 20th centuries, the state of early technologies, financial market conditions, the societal value of extending networks and the need to attract capital at attractive rates made the use and modification of the railroad model perfectly reasonable. Only later would weaknesses become evident, revealed by changes in the objective conditions that had given rise to the railroad model in the first instance.

The railroad model began to unravel where it began – in the transportation sector. In the late 1970s, during the otherwise uninspired Carter administration, the United States moved decisively to deregulate the airline, long haul trucking, railroad and intercity bus industries.⁷ Reminiscent of the railroad model’s history, ideas from the intellectual and academic community percolated into the political class and engendered an “elite” movement for change. Competition emerged as the alternative to regulation for high capital, low incremental cost transport businesses.

An interesting feature of the North American movement toward competition in regulated industries has been its relatively bi-partisan nature. In contrast, the process in Europe has been mainly one of initiation from the center-right and ultimate acquiescence and continuation by the center-left upon return to power. In the U.S., as the deregulation debates proceeded in Congress and in the states, bi-partisan coalitions were juxtaposed. On the side promoting competitive solutions there were Democrats of the “consumerist left” allied with Republicans of the “free market right.”⁸ In favor of merely reforming

⁶ The most well-known examination of the historical and philosophical underpinnings for the development of the North American regulatory models in utility and financial regulation is Thomas K. McCraw’s *Prophets of Regulation* (1984, Harvard University Press). While this paper does not address the dramatic deregulation of pricing and other aspects of the financial industries, such as banking and securities, it should be noted that that liberalization has generally been more complete than in utilities. This is due in no small part to the lack of fixed assets in those businesses that are anchored in some specific locale, thus facilitating higher level implementation of central policy.

⁷ Airline Deregulation Act (1978), Staggers Act (1980, rail), Motor Carrier Act (1980, trucking), Bus Regulatory Reform Act (1982).

⁸ Among the prime advocates of airline deregulation, for example, was Massachusetts U.S. Senator Edward Kennedy on the left. Gas pipeline open access efforts were spearheaded by Illinois Congressman Tom Corcoran on the right. Current U.S. Speaker of the House Dennis Hastert, a Republican, was a leader in telecommunications competition in the mid-1980s when he served in the Illinois General Assembly. A key

or improving upon the *status quo* of regulation was an alliance of organized labor Democrats and some “big-business” Republicans sympathetic to concerns of the corporate management of regulated businesses who feared competitive entry. In the end, especially as deregulation reached telecommunications and the energy utilities, the opponents tended to come around once their constituencies’ concerns had been largely satisfied. Highly prescriptive transitional mechanisms providing for displaced union workers and for the recovery of “stranded” investment smoothed the way.

Interestingly, the stated goals of deregulation were almost precisely those articulated for the imposition of the railroad model in the first place, with the exception, of course, of avoiding corporate failure by restraining competition:

- encouraging operating efficiency
- attracting capital;
- extending the network and service
- stimulating technology; and
- improving financial performance.⁹

About the same time, especially in the United States, the conventional regulatory set-up for electricity and gas was beginning to prove unsuitable for new conditions. Oil embargoes, high interest rates, inflation and the disruption of ongoing nuclear power plant construction projects by the reaction to the Three Mile Island nuclear incident combined to drive electric rates upwards in a nearly unprecedented fashion. Traditional utility economics were upended as new power plants started coming on line at a higher cost per unit of production rather than the lower cost as had been the case for many decade. Natural gas supplies fell short because of a

link between academia where the ideas about transportation had germinated and grown was Stephen Breyer, an antitrust expert and an aide to Kennedy and now a justice of the U.S. Supreme Court. Perhaps the single most important figure was an academic who had come into the regulatory arena as practitioner, Alfred Kahn, who had been chairman of the New York Public Service Commission prior to his appointment by President Carter to head the Civil Aeronautics (CAB) Board and led the deregulation of the airlines. Academics who moved easily in policy circles, such as Charles Stalon of Southern Illinois University (who served on both the Illinois Commerce Commission and FERC), Paul Joskow of Harvard and Richard Schmalensee of MIT, would have a dramatic impact on advancing competitive ideas about electricity. A former Wall Street executive appointed by Ronald Reagan in 1983 to chair the Federal Energy Regulatory Commission, Ray O’Connor, surprised his old investment banking colleagues by being the first of a succession of Republican and Democratic FERC chairs to promote open access of both gas pipelines and electric transmission.

⁹ This discussion is more fully developed in *The Path of Least Resistance: Accelerating the Movement to Electric Industry Competition through Transition Cost Compensation*, by Philip R. O’Connor and John L. Domagalski, for the Edison Electric Institute, September 1997.

Byzantine complex of wellhead price controls made it more profitable to sell gas within producing states such as Texas and Louisiana rather than pipelining it to residential gas heating regions in urban northern states. Canada, catching a cold when the U.S. sneezes, found itself inhibiting its export sales of gas from its vast western reserves into the U.S. because the export price could not fall below the Toronto city gate price.

Consumers defied conventional utility and regulatory expectations, reducing usage in response to gas and electric price rises. The bottom line was that regulation was no longer delivering either fair and affordable prices or the opportunity to recover the utility cost of capital. Most important of all, the requisite political bargain was collapsing.

The unraveling of the railroad model in the electric and gas industries in the United States began with accommodative measures. Many a revolution has started that way. Congress re-categorized gas reserves, basically distinguishing “new” and “old” gas,¹⁰ imposing an even more complex system of wellhead price controls. Congress also opened the door to competitive non-utility generation, mandating that local utilities purchase the output of small power plants meeting certain fuel, efficiency and ownership criteria.¹¹ These two changes would become hanging threads that, once pulled, would be the unraveling of the railroad paradigm.

In the late 1970s, the American and Canadian political systems were confronting new conditions in the electric and gas markets and the first reaction was to patch the old leaky boat of the railroad model – already abandoned in the railroad business itself. Europe was still pre-Maastricht and the Berlin Wall stood as solid as ever.¹² But change was afoot.

¹⁰Natural Gas Policy Act of 1978 (NGPA).

¹¹Public Utility Regulatory Policies Act of 1978 (PURPA)

¹²The 1992 Maastricht Treaty provides that “the Community shall contribute to the establishment and development of trans-European networks in the areas of transport, telecommunications and energy infrastructures.” The collapse of the Soviet Empire might well prove to be the most important energy “policy” yet for Europe. On the one hand, the integration of Eastern Europe into the EU represents a dramatic expansion of the trans-European network envisioned by Maastricht. On the other, Russia’s leverage as a natural gas supplier to the rest of Europe has recently raised the specter of a new form of hegemony emanating from Moscow.

The Paradigm Shift

President Jimmy Carter never presented the end of the railroad model in the transportation sector in broad philosophical or ideological terms.¹³ Engineer that he was, his goal was greater efficiency as well as a streamlining of government. Margaret Thatcher and Ronald Reagan came into office in great part on the strength of their predecessors' unpopularity, which was rooted to considerable degree in the accumulated inefficiencies and huge transaction costs regulation was imposing on the North Atlantic economy. They promised a philosophically based change of direction that included far greater reliance on markets and less on government regulation to improve economic performance and, importantly, to increase the personal and corporate economic freedom that they saw as integral to political freedom.

The main influence of both Thatcher and Reagan on the development of a new paradigm for electricity and natural gas in North America and Europe was to redefine the debate. They saw markets and competition, by reason of their inherent superiority, as the default policy position. For them regulation and government intervention were conditions that required ongoing justification. To some considerable extent they shifted the burden of proof to those defending regulation. Given the "federal" nature of both North America and Europe posited in this paper, Thatcher and Reagan were initiating experiments that could not be ignored and that were bound to influence thinking in other jurisdictions.

In just a few years, advocates of change were able to formulate market-based models for the natural gas and electric businesses that are in nearly full flower in many jurisdictions and that are juxtaposed to the continued presence of the traditional regulatory scheme in other jurisdictions.

¹³ President Carter must be credited with presiding over the initiation of dramatic liberalization in both the utility and transport sectors. According to Clifford Wilson, ("Economic Deregulation: Days of Reckoning for Microeconomics," *Journal of Economic Literature*, September 1993) in the late-1970s 17% of the US GNP was produced by highly regulated industries but by the late-1980s that figure had fallen below 7%. That figure must be fast approaching 1% today given general economic growth and contracting regulation. .

The Illinois Commerce Commission Policy Papers 1983-93

In the United States, the Illinois Commerce Commission (ICC) was the first regulatory body to actively advance the proposition of electric and natural gas retail open access at all levels of the delivery system – wholesale and retail.¹⁴ Starting in early 1983 and continuing through 1993, the Commission issued a series of policy monographs, educated the Illinois General Assembly, lobbied Congress, debated within the National Association of Regulatory Utility Commissioners (NARUC), initiated and intervened in matters at the Federal Energy Regulatory and devoted resources to the “speaking circuit” and media relations. All of the efforts were directed at replacing regulatory decisions with choices by customer and providers in an open market. Former commissioners and staff continued to carry the message even after leaving their regulatory jobs.

The ICC policy papers were neither flights of fancy nor were they farsighted economic treatises. Rather, just as were the great and enduring works of political philosophy from Plato’s *Republic* to Machiavelli’s *The Prince*, these much more mundane and fleeting writings of the ICC were attempts to deal with real situations at a point in history.

The century-old political bargain, a social contract of sorts, was *in extremis*. Utility rates were rising rapidly, gas and electric rates differed dramatically between neighboring utility territories, large utilities were near financial collapse and recriminations were the order of the day. Traditional utility regulation was producing results that were counterintuitive, contraindicated and counterproductive. The response of regulation to surpluses of natural gas and electric generating capacity was to raise prices rather than to lower them as normal supply and demand dynamics would. The objective under conventional regulation was to balance the recovery of utility investment and expenses with consumer interests. The reality, however, was financially weak utilities and dissatisfied, angry consumers at all levels.

While many policy monographs were produced in the decade 1983-1993 by the ICC, the two issued at the outset, the *Consumer Access Plan* for gas in 1983 and the *Ten Point Plan* for electricity in 1984, set out game plans to which the subsequent papers always fundamentally adhered.

¹⁴ The Illinois Commerce Commission was also a leading proponent of competition in telecommunications in the years immediately following the 1983 divestment by AT&T of its local telephone companies pursuant to an antitrust settlement with the U.S. Justice Department.

Gas open access began to develop rather quickly and steadily in the non-residential market as industrial and other large customers sought lower priced gas supplies as matters of survival. Many of the important initial policy decisions could be made at the federal level by FERC which regulate the interstate pipelines and wellhead prices. This set the stage for a number of state utility regulators to open up local gas utility distribution networks to competitive gas supplies for end-use customers.

In the late 1980s and early 1990s, FERC began to apply similar policies to the wholesale electric generation market and transmission pricing and access. However, there was an important difference that slowed the process. FERC regulated a far smaller piece of the pie in electricity. The local gas utilities overseen by state regulators generally did not own gas reserves or the interstate pipelines that delivered to the city gate and therefore accounted for only a modest portion of the industry. In contrast, local electric utility rates bases included much more of the supply chain including generation, long distance transmission and local distribution. The financial implications posed by the massive capital investment in electric generation included in local monopoly utility rate bases would delay the introduction of competitive retail electricity for another ten years.

The last ICC papers were issued in 1993, the same year that the California Public Utilities Commission (CPUC) issued the famous “yellow book” policy paper.¹⁵ The torch had been passed. By 1995, California had legislated open access for electricity and other states followed.

The ICC’s *Consumer Access Plan* for gas and the *Ten Point Plan* for electricity were predicated on a set complementary notions:

- competitive commodity pricing at both wholesale and retail levels;

¹⁵ *California's Electric Services Industry: Perspectives on the Past, Strategies for the Future*, California Public Utilities Commission, February 1993. Called the “Yellow Book” for the color of its cover, it provided a history of the electric industry and California’s regulatory structure from 1945 through 1993 and came to conclusions about the need for industry restructuring similar to those advance a decade prior by the ICC. The CPUC followed the next year with a plan for market restructuring with, known as the “Blue Book” (*Order Instituting Rulemaking on the Commission's Proposed Policies Governing Restructuring California's Electric Service Industry and Reforming Regulation* (R.94-04-031)).

- non-discriminatory open access to common delivery networks;
- liberalized entry and exit of providers;
- freedom of contract between providers and end-use customers; and
- regulation focused on “rules of the game” for market functioning.

While the key concepts seem simple and straightforward today, they were entirely counter to both longstanding practice and conventional expectations. Therefore, the difficulty of advancing market concepts was complicated by the need to demonstrate that they could actually be operationalized in the industry. Both papers sought to do so. The 1983 *Consumer Access Plan* for gas suggested a direct approach because the bulk of the costs were related to gas supply that could largely be addressed at the Federal level where regulation of wellhead pricing and gas contracting resided. Further, the interstate pipeline system is federally overseen and the ICC correctly argued that the rules for wholesale non-discriminatory access could be made by FERC – without the necessity of Congressional action.

In contrast, the 1984 *Ten Point Plan* for electricity accepted as a premise the greater complexity of a competitive transition in the electric industry due to the high sunk capital costs the central reality. The ICC adopted a view that the industry could make this transition in a step-wise mode, making each move in a logical sequence over a number of years eventually leading to full open access and customer choice.

Over the next several years a series of follow-on papers and speeches lent further weight to the *Ten Point Plan* as each was further explicated. Competition gradually gained traction as policy at the State and Federal levels.

The Ten Point Plan

Looking at the 1984 Ten Point Plan with 2006 eyes elicits a sense that many of the points are obvious and are naïve in presentation. The focus is on problems that are susceptible to remedy by competition. The proposed sequencing of an evolutionary transition from monopoly to competition gives short shrift to the problems of implementation, both financial and political. Yet in 1984 the elements of the plan were far from being the common features of the electric landscape of the North Atlantic economies that today define one half of the Grand Experiment.

Reviewing the Ten Point Plan today and considering the extent to which the electric industry has been restructured along the lines of that plan, one is reminded of Schopenhauer's succinct description of the three stages of truth: *First, it is ridiculed. Second, it is violently opposed. Third, it is accepted as being self-evident.*

The ten 'sequential' points in the plan, were:

- 1) Utility regulators would permit local utilities to charge **incentive rates** to retain price-sensitive industrial customers as long as the reduced prices made a contribution to covering fixed costs, thereby not burdening other customers with cross-subsidies.
- 2) Regulators, acting solely within their own states or in cooperation with neighboring states, would direct utilities to participate with one another in **centralized dispatch** schemes so as to assure optimal utilization of power plants with the lowest fuel costs.
- 3) Regulators and utilities would build on centralized dispatch by instituting **power brokerage and auction markets** that would leverage the growing capability of computerized data management to account for large numbers of bilateral or pooled power transactions.
- 4) The **realignment of FERC and state authority** would adjust regulatory jurisdiction so that states could more effectively implement wholesale dispatch and auction regimes within their own states while FERC would focus on interstate wholesale transactions.¹⁶
- 5) In recognition of the fact that electricity ignores state borders by following the "path of least resistance," states would join **interstate compacts** through which they would share authority over common wholesale power brokerage and auction markets.
- 6) FERC or state regulators would mandate non-discriminatory open access to transmission networks for **wheeling of power**, allowing customers and

¹⁶ FERC realignment and interstate compacts, as suggested in Points 4 and 5, were largely intended to convey the idea that the states were capable of formulating and implementing competitive reform within their own boundaries. The traditional legal fiction has been that transactions between utilities in the same state as well as across state boundaries were both inherently implicated in interstate commerce and therefore subject to Congressional regulation by delegation through FERC. Points 4 and 5, along with Points 2 and 3 eventually were subsumed in practice developed under Point 6 through the creation and operation of Regional Transmission Organizations (RTOs). A numerous states have required or permitted their local utilities to join regional transmission organizations overseen by FERC and through which the wholesale market and open access wheeling of power operates under competitive conditions across much of the U.S.

power suppliers to conduct competitive power transactions across increasingly larger market footprints.

7) The **unbundling of rates** would send accurate price signals about the various components of service, such as transmission, distribution, energy and capacity would allow competition where possible and would clear the “fog of regulation” distorting prices and obscuring costs.

8) **Diversity and devolution of supply** would introduce non-utility power plants into the market and vertically integrated utilities could be encouraged to sell power plants or to spin them off to affiliates in order to remove these assets from the regulated rate base and thereby make their generation output subject to price competition.

9) Utilities and other power suppliers would be allowed to engage in short and long term **contracting and off-system sales** with individual customers at negotiated prices.

10) Formal **spot and futures markets** would allow for bi-lateral as well as “trading floor” transactions by customers, power suppliers and speculators to engage in price finding and hedging and a more accurate determination of future energy and capacity value.

The State of the Ten Point Plan in 2006

In 1984, the world of electricity was organized along the lines of a common model based on a shared belief that a specific industry structure was implied by the prevailing electric technology and financial requirements of the industry. A little over two decades later, the operational principles postulated in the Ten Point Plan have been manifested in public policy and industry practice in both of the great federal politico-economic systems of the North Atlantic.

Although EU competitive energy market policy directives for electricity and natural gas have been promulgated, the member states have implemented those directives to widely varying degrees. While central EU policy pronouncements provide a seemingly clear time frame for making a complete transition to competitive markets at both the wholesale and retail levels, considerable doubt exists as to whether those timetables will be met.¹⁷ The United Kingdom, The Netherlands and the Scandinavian

¹⁷ See Galchant and Lévêque for a description of the variations in EU electricity policy directive implementation.

countries have fully implemented retail open access while others have gone part of the way or have allowed access nominally or have done relatively little.

In the U.S. and Canada, gas and electric wholesale markets generally operate on a competitive model and national level regulators and policy makers show no sign of retreating to traditional cost-based regulation. In North America, individual states and provinces retain the legal authority, at the sufferance of their national legislatures, whether to implement retail choice and open access. State and provincial authorities also control sales of generation and delivery system assets and



Retail Access States/Provinces

retain a significant role in mergers and acquisitions. Europe and North America both suffer from various congestion points and also have points of integration that are more a function of geography than of national boundaries. For example, the Canadian and U.S. electric markets are

actually more integrated on a north-south cross-border basis than on an east-west national basis.¹⁸

At this point in North America, states and provinces accounting for just about half of all electricity consumption have adopted retail open access policies whereas a decade ago, there was virtually no retail access at all. Similarly, whereas two decades ago about 90% of all generation was produced by plants owned and operated by classic vertically integrated utilities (with the other 10% accounted for by government entities), today that figure is closer to three-fifths. Nearly 30% of all U.S. generation comes from non-utility power plants.¹⁹

It is likely that this bifurcation will continue for sometime thus creating the conditions for the Grand Experiment.

Measuring the Results of the Grand Experiment: The Ten Tests

In certain respects, the era of polemics about the preferred structure for the electric and gas industries may have passed. We are in a more practical period, having passed through Schopenhauer's first two stages, ridicule and violent opposition, but short of the third, acceptance by all as obvious. The old, shared certainties about electricity and gas have been shattered. There is a greater openness to looking at the direct evidence of the relative performance of competitive systems and more traditional regulation as the two operate side-by-side.

Strong evidence of the demise of the old verities of the industry can be found in the recent survey of North American utility executives by GF Energy. First, the diversity of opinion about the likelihood of various possible developments in the industry over the next several years is quite striking. Deep division can be seen on the role of competition and regulation, issues that would have found near unanimity two decades ago, or would not have been contemplated at all. Second, irrespective of views on retail open access, there is a strong current of opinion that technology and

¹⁸ Interestingly, while total Canadian electricity exports to the U.S. have grown by about 12% between 1993 and 2004, U.S. electricity exports to Canada have grown by well over 700%, meaning that the ratio of Canadian exports to its imports for the U.S. was about 3:2 in 2004 compared to about 11:1 a decade before. See Table 6.3 U.S. Energy Information Administration's *Electric Power Annual 2004*.

¹⁹ These figures are interpolated from Table 6.2 of the EIA's *Electric Annual Report 2004* and may be somewhat understating the role on non-utility generation in 2006.

information developments will have a significant impact on customer usage patterns.²⁰

In the spirit of maintaining symmetry with the original Ten Point Plan for electricity, we suggest consideration of Ten Tests to compare relative performance as the experiment proceeds. The measures must be quantifiable in some reasonable way and they cannot be biased toward one regime or the other. For example, there cannot be a measure of the extent to which generation assets are owned separately from wires companies or to which end-use customers more quickly see prices reflect any imbalance between supply and demand. These measures inherently differentiate the two systems. Rather, the measures should focus on the ability of one system or the other to yield results that would be considered desirable irrespective of whether one were disposed toward competition or toward regulated monopoly.

The Ten Tests below are in no particular order of importance. We do not specify the precise manner in which they may be quantitatively operationalized, but we would assert that they or some comparable measure could be quantified in making a comparison between the two systems.²¹

1) Power Plant Operating Efficiency

Under which system will kilowatt hours be produced and delivered most reliably at the lowest incremental and all-in costs? Different systems may provide different incentives and conditions that lead to choices of power plant types, staffing decisions, fuel contracting and operating practices. An interesting feature of electric industry development over the past 15 years in the United States has been the dramatic improvement in nuclear power plant availability and capacity factors. This improvement has been coincident with the emergence of wholesale and retail competition as well as with considerable merger activity creating much larger nuclear operation as well as “de-rate basing” of nuclear plants. Yet it cannot be conclusively said that the improvement has been the result of competition.

²⁰ *GF Energy 2006 Electricity Outlook*, GF Energy LLC, <http://www.gfenergy.com/outlook06.html>

²¹ The more significant methodological problem in applying the Ten Tests is not the quantification of the tests but, rather, the classification of the units of analysis into two categories, l’Ancien Regime and New Paradigm.

2) Attraction of Investment Capital

The electric business is capital intensive no matter the regulatory and structural model. The initial challenge of the railroad model of regulation was creating conditions helpful in attracting the massive amounts of capital needed to build-out, grow and maintain the network. A central issue is which system can better create an environment in which financing can be secured for new generation additions. In parts of the U.S. large amounts of new generation were added in the later 1990s in response to the first open access laws in such states as Illinois. Those additions produced reserve margins that, until recently, deferred talk of the need for new capacity. With wires companies remaining under more traditional rate regulation even under open access conditions, which system will better provide for raising capital for power plants?

3) Curtailing Demand

One of the perennial issues in the electric business is how best to improve load factors and to achieve less difference between peak and off-peak extremes. Any number of methods ranging from real time pricing to involuntary interruption and appeals to social responsibility might be applied to achieve the desired results. Which system can do the better job of encouraging end -use customers to reduce demand at peak periods or to shift their usage from peak to off-peak periods?

4) Curing Congestion

Another perennial issue is that of transmission congestion points and load pockets. The reasons range from the vagaries of geography, population and demand growth exceeding expectations and legacy constraints. Which system can better cure congestion at certain transmission bottlenecks and reduce instability and costs of serving load pockets?

5) Reducing Emissions

The production cycles of most electric generation involve emissions of some sort, even if only carbon dioxide, the most recent target for limitation. The success of sulfur dioxide emissions reduction trading, inaugurated under the 1990 Clean Air Act Amendments in the U.S., has been coincident with the emergence of competition in electricity, but not dependent on electric industry restructuring. SO₂ trading has been emulated with other pollutants such as nitrous oxides and even mercury. Most recently, in Europe, CO₂ reduction trading has begun. The two different systems of electric industry structure and regulation can be judged partly on their respective ability to reduce emissions at lower cost.

6) The Next Generation of Nuclear Power Plants

Separate from the attraction of capital for new power plants and wires is which industry structure or regulatory regime will better accommodate a new generation of nuclear power plants. While other political, regulatory, environmental, technical and financial issues will all figure into the development of new nuclear plants, it is worth exploring whether competition or traditional utility regulation will be more hospitable.

7) Reducing Inter-Class Cross-Subsidies

One of the central tenets of those who have promoted the competitive regime has been that market-based pricing will deliver more accurate price signals and more properly link prices to economic costs of service. On the other hand, there are those who see rate regulation under the traditional railroad model as an opportunity to create a dizzying mélange of cross-subsidies. Some will favor assisting residential customers at the expense of business customers, while others may favor special “below cost” rates for certain industries regarded as critical or of strategic importance or matters of national pride. There are still others, however, who will contend that traditional regulation can indeed send price signals that are better in keeping with the underlying economics of the power business, smoothing out the highs and lows and better incorporating social costs and objectives. The question remains whether one system or the other will ultimately set prices in a fashion more closely in keeping with cost causation principles.

8) *Low Income Customer Connectivity*

While it may be argued that the question of inter-class cross -subsidies is intimately related to low income customer connectivity, the issues can be addressed separately. In North America and in the EU, most residential electricity customers are not poor and are quite able to pay for both basic amounts of power and for purely discretionary usage. If the objective is to better assure that the poor can be connected to the network and have basic services available, then inter-class subsidies are not necessarily the best avenue. Which system will do a better job giving low income customers access to essential electric service? Will one regime or another employ more creative and effective measures and leverage technology?²²

9) *Customer Satisfaction and Minimizing Political Controversy*

Whether a business is regulated or not, the ultimate standard for success is whether customers are being well served and whether they believe they are being well served. Customer satisfaction research is widespread in the electric business, as it is elsewhere in the economy. Levels of customer satisfaction can be measured cross-sectionally and longitudinally to determine whether competitive or regulatory regimes are producing higher levels of customer satisfaction. On a related front, the movement toward competition was in great part a search for a way to “de-politicize” price setting and other aspect of the electric business that had become serious bone of contention in the political arena. There may be those who would contend that the regulatory process ought to be political in the sense that it is a form of economic democracy, making decisions about assets affected with the public interest. However, the railroad model was originally designed not as a political process but as an administrative process run by experts and professionals. In the end, of course, the outcome of the Grand Experiment comparing competition and traditional regulation is fundamentally a political question in both of the two great North Atlantic federal systems.

²² The authors made the argument a decade ago that the application of technology and sound economics could enable the competitive model to advance the cause of extending serviced and lowering costs for low income customers. See O’Connor, Philip R.; Jacobson, Erik B., and Barnich, Terrence L. “Regulation or Technology? Low-Income Customers and the Transition to Competition,” *Public Utilities Fortnightly*, November 15, 1995.

10) *The Pace of Technological Innovation: Creating the InfoCom Utility*

One of the key societal goals of the railroad model was extending the benefits of new and wondrous technologies to more and more people. However, those advocating the movement to competition have maintained that whatever the original objective, traditional regulation eventually was discouraging technological innovation because sunk costs were destiny in cost based regimes.²³ One test might be the pace at which new electric technologies are introduced in production, delivery and consumption phases.

The pace of technological change raises the question of whether a competitive or traditional industry structure can better accommodate the creation of what we would call the InfoCom Utility. At what point does the utility become something new and different, whether under a competitive or traditional regime? At which point is utility management acculturated into a new way of thinking that leaves behind the old industrial and bureaucratic mentality and enters the information age?²⁴ Integrating values that underpin the advanced communications and information networks into the core business of the natural gas and electric industries would have a transformative effect whether retail electric prices are regulated or are set by the market.²⁵

The InfoCom Utility relies on the management and communication of information within the system and with customers to optimize the value of the service and products it supplies.²⁶ The InfoCom Utility could provide information services that help customers effortlessly manage their power

²³See, e.g., Alfred E. Kahn, *Letting Go: Deregulating the Process of Deregulation*, Institute of Public Utilities, Michigan State University Press, 1998; Robert W. Crandall, *Competition and Chaos*, Brookings Institution Press, 2005.

²⁴The Illinois Institute of Technology in Chicago and the Galvin family that built communications powerhouse, Motorola, Inc. have embarked on a joint project to leverage wireless and other communications technology to create the “perfect” electrical la system with far greater reliability and customer control. “Motorola’s First Family Now Focused on Redesigning Electrical Distribution,” *Daily Herald* (Arlington Heights, Illinois), August 21, 2006.

²⁵Clark W. Gellings and Kurt E. Yeager, *Transforming the Electric Infrastructure*, *Physics Today*, December, 2004, at p. 13: “[Information technologies] have transformed every major industry in the Western world except the electric power industry....What we do need is to use advanced technology to modernize and enhance the use of the existing asset base.”

²⁶Some utilities in both the U.S. and Europe have been going down the road to create intelligent electricity networks to, in the words of Spain’s ENDESA, “achieve maximum quality and efficiency in distribution, predict demand, anticipate instabilities and increase the flexibility of the electricity distribution operation by incorporating sensors, and real-time communications and systems management.” ENDESA Press Release, June 28, 2006

demand and usage and trade reductions in the market, protect their electricity-driven devices from power surge damage and have additional choices for telecom provision. Further, the InfoCom Utility might leverage electric system physical assets to provide telecommunication services to end-use customers or to other telecom providers.

Just as companies like UPS, FedEx and DHL have transformed themselves from low-tech, labor-intensive package delivery businesses into IT power houses, so too can successful energy firms integrate their energy networks with communications delivery systems in order to squeeze more efficiencies out of their operations, improve power plant availability and capacity factors, curtail peak demand and have the operational ability to send more accurate pricing signals to customers.

In the end, the integration of advanced information and telecommunications technologies into the utilities' operations likely is the key to success on many of the Ten Tests of the Grand Experiment. To the extent that improvements in all of the ten measures are more or less interdependent, the Grand Experiment model that more quickly and thoroughly adopts the advanced information technologies will win the race.

Expect the Unexpected

In the years immediately following the proposal of the Ten Point Plan over two decades ago, the lines were clearly drawn between those who advocated a upending of the *status quo* and concerted reformulation of the industry and those who defended the traditional system as the essential condition for continued reliable and affordable service. Few would have suggested the landscape we now behold as we undertake the Grand Experiment. One lesson from the past two decades of change in network industries is that no prescription is valid for long and that the human factor refuses to be confined within any model.