



*A University-Business Learning Partnership*

**NORTH AMERICAN ENERGY INTEGRATION**  
*The Prospects for Regulatory Coordination and  
Seamless Cross-Border Transactions*

**PREFACE**

Can a customer in Monterrey, Nuevo Leon directly purchase gas or power from a company in Vancouver, British Columbia? Do events in California energy markets matter in North Carolina? Are the North American gas and power industries growing closer together and, if so, is this a good thing? Should the governments of Canada, the U.S. and Mexico make explicit efforts to align their energy policies, and *could* they – in light of our complex histories and relationships? The North American energy region is rich with questions and debates like these. All are pertinent to the range of interests from energy CEOs to the smallest customers, from regulators to elected and appointed policymakers. Our energy future rests on the outcomes of actions taken yesterday and today that will make North America either a more or a less cohesive continental market for natural gas and electricity. We are not the only region engaged in this test. Many parts of the world are faced with the need to cooperate out of necessity. The combination of overarching economic trade regimes and policy and regulatory compatibility may be the hallmark of emerging constellations of countries linked by shared energy resources and networks. The fundamental issue is whether these ingredients necessarily work together to produce the results, intended or otherwise, that might be expected.

For the past two years, an Energy Institute-led team engaged in a conceptualization of the North American natural gas and electricity markets in order to begin the process of unraveling this issue. Ours was a very different effort than has typically been conducted. *North American Energy Integration* is not a “data driven” analysis, because this kind of input can be obtained elsewhere. Although we present two scenarios for consideration, our study does not constitute an effort to forecast or predict outcomes. Rather, we have attempted to identify the cross-cutting factors that are prevalent in long-term North American energy relationships and isolate these from the short-term variables that are most readily apparent. And so, how should the reader use this report?

*North American Energy Integration* certainly should be used to gain longer term perspectives on the myriad of attributes associated with natural gas and electricity markets and trade. Our study provides context for many of the complex and ongoing interactions between suppliers and customers. We contribute a point of comparison to other world regions that exhibit similar dynamics of competition and cooperation, regional trade regimes and particularistic interests, setting aside sovereign control – as long as it is politically convenient. A reader unfamiliar with the North American energy scene may feel a bit unprepared; we provide an Appendix that will give most newcomers the pertinent background information necessary to understand our process, conclusions and recommendations.

We do offer a message, a wake-up call, to the reader, especially one for whom the North American energy scene is intimately familiar. For the most part, we found good news. But weaknesses in market structures or the commitment to market structures could easily introduce threats. We also offer an observation. Strategic control or deployment of interconnections – where networks cross jurisdictional boundaries or each other (market centers and hubs, loops and intersections) – has always been important, but will become even more so.

A study of this scope bears several acknowledgements.

- Funding was provided by the Shell Oil Company Foundation, through the Shell Interdisciplinary Scholars Program at the University of Houston.
- Additional funding was provided by Corporate Sponsors of the Energy Institute.
- More than 100 individuals lent their expertise to our effort. We have elected to treat our sources confidentially save where remarks were made in a public context, but we could not have undertaken this study without their input.
- The departments and colleges among which the members of our research team are located provided institutional support and encouragement, as did the leadership of our university.

We hope that our journey and its end points are useful to the reader!

— Michelle Michot Foss, Ph.D.

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# NORTH AMERICAN ENERGY INTEGRATION

## *The Prospects for Regulatory Coordination and Seamless Cross-Border Transactions*

### EXECUTIVE SUMMARY

#### Background

In January 1996, an interdisciplinary team of faculty and students at the University of Houston led by the Energy Institute launched a two-year “thought experiment” on North American natural gas and electricity integration. The purpose for this investigation was to explore the consequences for energy with the North American Free Trade Agreement in place. Our study was funded through the Shell Interdisciplinary Scholars Program at UH with support also from Corporate Sponsors of the Energy Institute. Our team brought together several perspectives – business economics, historical, political, and legal – in an endeavor to conceptualize for energy what is generally perceived to be the most open market in the world for overall trade and commerce. We posed the following questions.

- *What are the prospects for harmonizing policies and regulations affecting natural gas and electricity across the three North American Free Trade Agreement (NAFTA) countries?*
- *What are the implications of harmonization for seamless transactions?*

These questions are important because of certain presumptions and attendant expectations that have arisen with the NAFTA, of which the following three ideas have achieved prominence.

1. “Canada and the U.S. maintain the most seamless border in the world; there are no real issues for Canada/U.S. integration.”
2. “In general, the NAFTA will lead to a balanced commercial trade regime despite differing levels of development among the countries because the new regime will help to ‘bring Mexico along.’”
3. “Even though energy was not a significant component of the NAFTA, market reforms elsewhere in Mexico’s system will create pressure for significant restructuring of Mexico’s energy sector.”

We targeted the North American natural gas and electricity industries because of the enormous change unfolding in two industries that have been dominated by public interest issues and public utility regulation and policy. Since the late 1970s, Canada and the U.S. have engaged in a massive restructuring of their natural gas sectors, in order to increase the opportunities for competition and market-based transactions and minimize monopoly power. Now, the situation in both countries is quite similar.

- The production of natural gas is competitive.
- Long-distance inter-jurisdictional (meaning across national, state or provincial boundaries) transmission of natural gas is “contract carriage,” what we term “open access” but which simply means that pipeline operators must provide comparable and nondiscriminatory service to any shipper, and strong third party marketing functions have evolved.
- Local distribution companies (LDCs or local gas utilities) are being pushed to adopt more competitive standards and allow contract carriage on their systems. This latter experiment is much more widespread and aggressively pursued in Canada; progress in the U.S. is much slower and resistance is high.
- The U.S., with Canada following, now is moving toward a similar, and clearly more wrenching, restructuring for electric utilities driven in large part by the growing influence of lower-cost

natural gas-fired electricity generation and the increasing convergence of the natural gas and electricity industries.

Mexico also is enacting changes for natural gas and electricity that are historic. Mexico's changes parallel those in Canada and the U.S. but also contrast in one important respect: federal control of Mexico's energy sector is being preserved and, in a sense, strengthened.

- In 1993, Mexico adopted rules for private investment in electricity generation, but its national electric monopoly, Comisión Federal de Electricidad (CFE), retains control of purchases, transmission and distribution of electricity generated by private facilities. Like many developing countries, the electricity infrastructure in Mexico is more advanced than for natural gas.
- In 1996, Mexico elected to introduce competition into natural gas pipelines, distribution and storage, but its national oil monopoly, Petroleos Mexicanos (Pemex) retains control of natural gas production and processing and has considerable power in transportation, industrial and electric power generation markets. An interesting issue for Mexico and other countries is the degree to which “downstream” segments (like pipelines) can be subjected to market forces while natural gas production “upstream” is not. The consequences for end-use, like power generation, can be substantial.
- Also in 1996, Mexico adopted policies and a regulatory structure at the federal level (the Comisión Reguladora de Energía or CRE) that is similar to its NAFTA partners (the National Energy Board or NEB in Canada, Federal Energy Regulatory Commission or FERC in the U.S.). The CRE also has authority over local infrastructure projects and tariffs in addition to national infrastructure and tariffs. This compares to the U.S. and Canada, which have highly decentralized federalist systems with state and provincial regulatory commissions that have authority over local (intrastate and intraprovincial) infrastructure and tariffs and that were established well before the NEB and FERC.
- The CRE, which also is charged with the sale of certain assets to private interests, has proceeded with auctions for local distribution franchises and bids for power projects (a review of activity in Mexico is provided in the Appendix). A second issue for Mexico and other countries is whether the strategy of vesting newly created regulatory authorities with privatization responsibilities may raise conflict of interest possibilities or affect regulatory credibility.
- Fuel choices for power generation are increasingly market driven in the U.S. and Canada (save for specific issues with Canada's Crown corporations, addressed later in this report). In Mexico, fuel choices for power generation are subject to national policy.

For the most part, the physical parameters of the North American gas and electricity systems are fairly well known, and there are any number of studies that attempt to forecast and predict supply/demand balances into the future. Our premise was much more basic. Through the evaluation of current information, in depth interviews and a well-thought-out scenario exercise we hoped to uncover barriers to the free trade of natural gas and electricity via the ultimate integration of physical networks and complementary policy and regulatory practices in the NAFTA zone. Once those barriers were revealed, recommendations could be made and acted upon. Our topic of study is a moving target – nearly everyday or week events occur in North American gas and electricity markets that alter expectations, perceptions and potential future pathways. Our challenge was to attempt a longer term view and separate hype from sound strategies, isolate short term deviations from long term trends and identify and, hopefully, avoid the array of biases that infiltrate viewpoints about North American energy relationships.

Of interest to all actors in the new marketplace is how much time must pass before these expectations are realized, if indeed they are. We assume in our study that ultimately, over some time frame, we will witness the creation of and reliance on market institutions of some form in Mexico. We expect

that a relatively open, three-way commercial trade flow for gas and electricity will evolve within the NAFTA zone that yields positive net benefits. Timing hinges on the various impediments that exist and the strength of those impediments. In general, transactions across the Canada/U.S. border appear to be relatively seamless. Regional gas markets in Canada and the U.S. are tightly bound together given our similar stages of development, infrastructure (including policy and regulatory institutions) and our reliance on market institutions. These conditions are less apparent for electricity and thus the outcomes are less clear. Furthermore, while Mexico has taken some important steps, which we acknowledge in our study, we also can see the rather profound difficulties and constraints that are in place to Mexico's full integration.

In our study, we were concerned with non-tariff barriers, those practices, and rules, regulations and institutional arrangements that discourage free trade in energy. However, we did not explore the minutiae of policy and regulatory frameworks across the continent, nor was that our intention. More important to a functioning, integrated North American energy market are the more subtle signals that come from the differences within and among the three partner countries. These signals affect whether there truly can be a level playing field with consistent rules of the game within a reasonable time frame. We consider "energy integration" to mean both physical and institutional. Natural gas and electricity "convergence," an idea whose time seems to have come, is part of our framework. The more closely these two industries grow together, the more inevitable continental integration may become.

While the physical dimensions of integration are apparent, institutional ones are less easily defined. In the policy and regulatory dimension, each sovereign nation (Canada, the U.S. and Mexico) maintains separate federal level jurisdictions and, in the case of Canada and the U.S., separate provincial and state jurisdictions for energy. There is no "continental authority" or coordinating body nor is there any attempt or, as far as we can tell, any desire to create one (nor do we make that recommendation in our study). There are, however, informal arrangements that exist in some important areas.

- Regulatory approaches to natural gas and electricity in Canada and the U.S. are strongly parallel. In both countries, organizations exist that coordinate across provincial and state regulatory commissions.
- National energy agencies in Canada (Natural Resources Canada or NRCan) and the U.S. (Department of Energy or DOE) have maintained communication and coordination through bilateral meetings. The strength of this relationship has varied over time, and is currently weak given the reduced role of federal policy making for energy in both countries.
- Mexico has been drawn into these informal networks, both through the CRE and Secretaría de Energía (SE).<sup>1</sup>

Our approach was simple. We launched our study with the North American Energy Roundtable on June 6, 1996, an invitational forum that allowed us to interact with industry and government experts from Canada, the U.S. and Mexico. Delegates to the roundtable were drawn from the extensive networks maintained by the Energy Institute. We followed the roundtable with interviews of key individuals and collection of data and information. We conducted baseline legal analysis of the NAFTA and political and technology considerations. Finally, we conducted a scenario exercise in December 1996 designed by the graduate students involved with our study. Our goal for the exercise was to explore all facets of our conceptual marketplace in light of everything we had learned and evaluated. In the months following the roundtable, we conducted supplemental interviews and monitored events in the North American energy marketplace to test our conclusions.

This report contains the results of our research. It is a frank assessment of the situation for North American natural gas and electricity, from perspectives that are often not considered or are treated only lightly. Throughout this document, we include information gleaned from the numerous interviews we conducted, as well as input gained during the June 1996 North American Energy Roundtable. We treat all interview information anonymously. All of our conclusions, their implications and the interpretation of information gathered to support our analysis are the product of our own thought and evaluation.

## **Analysis and Findings**

### ***Historical and Economic Considerations***

Our study rests on two assumptions with respect to energy integration. The first suggests that the highest level of efficiency is reached with free market competition. We used the concept of “marketization” to capture the process of establishing rules and norms for properly functioning market transactions. The implication of our first assumption is that the most efficient trade flows will also be linked to the degree of competition. Our second assumption is that the ability to foster competition is influenced both by trade flows and by strength of state ownership and control. Successive policy actions (trade laws to regulation to open access, which facilitates competition associated with infrastructure) can lead to reduced monopoly power if they are not overwhelmed by the opposing strength of government ownership and control.

Energy integration might unfold in several different ways. Mexico is at a much different point developmentally than the U.S. and Canada. While we largely have our infrastructure in place, so that strategies revolve around maintenance and expansion, Mexico has substantial infrastructure needs particularly in impoverished and remote rural regions. Although the U.S. and Canada have experimented with government owned or controlled energy enterprises (to a much larger degree in Canada) and while these enterprises pose peculiar problems and constraints, neither country has relied solely on government owned enterprises for the provision of energy goods and services. Mexico contrasts directly in this regard. Finally, while provincial Crown government ownership of resources exists in Canada, resource extraction and supply are competitive endeavors. The starkest contrast between Mexico and its partners is the constitutional reservation of oil and gas to the state on behalf of the Mexican people (the patrimony). The available pathways for North American energy integration, therefore, are distinguished by the fundamental characteristics of how the respective energy sectors are organized.

When our process models for marketization and trade flows are combined with the context of North American energy integration and the NAFTA, several broad issue categories are raised.

- **“Publicness” of the natural gas and electricity industries.** This concept embraces the nature of “public interest” in its historical usage (ownership and operation of public companies and whether this is the same concept as “monopoly.” Importantly, within any commercial trade regime, “privatization” does not necessarily lead to free trade.
- **Timing of restructuring.** The nature of restructuring and length of transition are crucial to understanding the future shape of the North American marketplace. Importantly, publicness is related to energy restructuring (the problem of getting around state monopolies) and thus to timing.
- **Governance.** Across North America there is variability in the nationalism/federalism dimension. This differentiates the NAFTA partners and has huge implications for publicness and timing.

- **Economic development.** We must accept that there is also variability in the comparative economic development of the NAFTA partners. This dimension affects publicness, timing and governance.

These four broad issue categories form the basis for our thinking, our scenario analysis and our interpretations of the results from our scenario analysis. They are derived from our review of historical and current conditions and our analysis of key legal, political and technology transfer considerations for North American energy development and trade.

### ***Legal Considerations***

Several conclusions can be drawn from our analysis of legal considerations.

- Energy trade among the major North American countries has had a turbulent history. Government control of export and import licenses in particular resulted in uncertain or complex regulations that regularly imposed delays and administrative costs and sometimes prevented culmination of the transaction. In some cases the latter was the result of government decisions. In others it was caused by government ineptitude or political maneuvering.
- As a primary industry, energy transactions will always invoke issues of public policy. The public interest is particularly affected with imports and exports, which have repeatedly raised issues related to price, need and security.
- Over time, through regulatory changes, statutory enactments, and international agreements, the U.S. and Canada have established complementary systems of trade regulation affecting natural gas. The stage has been set for nearly transparent trade activity that promises to allow an efficient distribution of energy resources between the two countries.
- Despite hopes that Mexico could be included in this energy market, potential barriers remain even under NAFTA. This results from the reservations and restrictions insisted upon by Mexico itself. While both the U.S. and Canada stand ready to include Mexico in an integrated energy market, Mexico has elected to take a more cautious approach. This hesitation was to be expected, given the historical and political significance of the energy industry in that country.
- As a result of Mexico's NAFTA rights, the eventual direction of energy trade with that country remains in its own control. While Canadian and American companies may be ready and anxious to enter the Mexico's market, the ultimate decision will rest with the Mexican government. The outcome awaits major political and economic decisions affecting the country's energy market and its state-owned monopolies.

### ***Political Considerations***

An overarching trend around the world is the meshing of commercial trade and energy trade networks. Apart from the NAFTA region, the European Union, Mercosur (which involves Argentina, Brazil, Bolivia, Uruguay and Paraguay with Chile as an associate member) and emerging regional trade networks in southeast Asia and the FSU-Asia-Middle East all present a compelling argument for setting physical infrastructure integration within a context of trade agreements. Europe is frequently regarded to be a model for or parallel to the NAFTA regime, although NAFTA is not intended to be a common market. In comparing Europe and North America, Europe's grids have been more easily integrated physically. A main difference between the two trade regions is that in the NAFTA, the more central and powerful countries support open access, and have used regulatory actions to restructure natural gas and are moving in similar fashion on electricity. In Europe, it is the peripheral

countries that would like to open natural gas and electricity grids to market forces. Stronger countries, such as France and Germany, would like to maintain a government control. Part of the debate in Europe centers on the role of regulation in forcing market-based options, including whether that function should reside at the European Commission level or at the member country level (where the United Kingdom is the best example of aggressive, some say overly so, regulatory restructuring). The U.S. is an often-cited example of mistakes that should be avoided with respect to energy policy and regulation, Canada as a generally favorable example of successful regulatory restructuring and management.

Our analysis suggests that the effect of NAFTA has been minimal with respect to continental energy trade and regulatory integration. NAFTA is a much weaker institutional arrangement than the EU, but this might not be an undesirable situation. While the economies of EU Member States are highly integrated, integration has had some undesirable consequences (a notable example being the rigorous standards imposed on weaker economies in order to achieve monetary union). This general experience has raised suspicions about energy integration, especially with regard to the issue of whether a European Commission-level regulatory body should exist that would supersede national interests. In addition, the jury is still out on the ability for strong and weak economies to successfully combine in effective trade regimes (again, the notable example in Europe is the struggle to embrace the Central and Eastern European countries). The purpose of regulation in Mexico is to reduce uncertainties and create a more favorable environment for direct foreign investment. Therefore, a “NAFTA energy regulatory code” might not be the answer, because not only would there be problems with the effectiveness of such a code, but also with whether it would be the right code for all three countries given their respective levels of development.

Our negative finding is softened by two forces presently taking place that are desirable and sufficiently similar, which demonstrates that the three countries may be more integrated than one might think if in other ways. One is movement in general toward greater reliance on markets in all three countries. Second are energy regulatory developments, specifically in Mexico, that could only have taken place as the institutional contexts became increasingly market friendly.

Not all changes on the horizon for North America are likely to be market-based. Though the vast majority of experts consulted for this study, within the industry and government circles, have shown a willingness to increase reliance on market solutions, there will always be a tendency to take care of the “what-ifs” with non-market solutions. Supply shortages and energy price volatility will always be a serious threat to initiatives in any of the three nations, in particular when mixed with long histories of exercising government control in times of perceived crisis. Historical precedent will make the transfer of responsibility from public to private domains a slow process, even slower where government control has been strongest. The most likely way to succeed in overcoming resistance to market-based solutions for energy and a consequent broadening of continental natural gas and electricity trade and market efficiencies is to begin slowly with pilot projects, or smaller experiments. The success of these projects will likely help to convince the skeptical. Here, signs are encouraging not only with respect to the border regions and in particular Mexico’s, but with demonstrations that are opening doors to market-based solutions throughout Canada and the U.S.

### ***Technology Transfer Considerations***

Defining technology transfer – how it takes place, how the process can be improved and the notion that there is a technology associated with endeavors such as regulatory oversight – are more subtle but no less important features of the context for North American energy integration. Two important themes can be drawn from our analysis.

First, with respect to the transfer of hard energy technologies, one of the most important remaining questions that will work to further or inhibit integration is whether Mexico will generate incentives, in the form of sufficient commercial opportunities, for foreign companies to share their proprietary technologies. Oil and gas exploration and production technologies are problematic. The transfer of upstream technologies is inhibited by the inability for foreign private firms to participate in oil and gas production. Acquisition of “off the shelf” technology is slowed by remaining tariffs on energy products and services as a result of the NAFTA phase out. Downstream gas technologies, in particular for applications like pipeline system management, metering, repair and maintenance, should be more accessible to Mexican firms because of the CRE’s restructuring and ability of foreign firms to participate in those businesses. The same will be true for electricity if sufficient commercial incentives exist. In addition, however, Mexico’s national energy companies must provide incentives for their own managers to adopt and implement new technologies and knowledge.

Second, our analysis makes clear that regulatory technology transfer must be distinguished from overt policy coordination. Formulating a common regulatory code is a separate question requiring a difficult solution. What is apparent is that common practices are facilitated through informal channels. It is a relatively easy solution to increase the level and depth of contact among officials and their staffs charged with responsible and effective oversight of natural gas and electricity development and services. In either case, we caution again that adoption of common practices that inhibit competition and market-based solutions are not preferred. Such an outcome would serve to disrupt transactions and North American energy integration, creating potential lost benefits continent-wide.

### ***Overall Conclusions on the NAFTA***

Our first task was to evaluate the role of the NAFTA on the basis of these assumptions. We formed the following general observations.

- Overall, the NAFTA formalized a commercial trade regime for three countries already linked in a number of ways. However, it is important to acknowledge that the NAFTA is not, nor was it intended to create, a common market.
- What could not be achieved with the NAFTA is significant for the problem at hand. The NAFTA does not include a strong resolution toward competition, clear dispute mechanisms or, importantly, a level playing field for energy.

With respect to energy, the contributions of and omissions in the NAFTA are clear.

- The NAFTA instituted specific concessions for petrochemicals, natural gas, electricity and energy services.
- The NAFTA does not provide any resolution on government monopolies, formalize arrangements for energy regulatory harmonization (not that it should have) or extend the energy crisis provisions from the Canada-U.S. Free Trade Agreement to Mexico.

**Finding:** Given the treatment of energy in the NAFTA, the lack of clarity with respect to provisions that indirectly impact on energy and the historical, economic, political, legal and technology considerations associated with North American energy, the NAFTA provides only a weak framework for North American gas and electricity integration. Consequently, trends toward integration are and will be more heavily influenced by other factors – the historical, economic, legal, political and technology contexts for natural gas and electricity development and trade.

## *Results from Our Scenario Analysis*

The alternative futures we analyzed were based on the two questions posed for our study.

- *Will the process for electricity restructuring parallel natural gas restructuring in Canada and the U.S.?* This question constitutes Alternative Future 1, “A CUS System for Electricity.” It suggests that a “single market” for electricity emerges between Canada and the U.S. that mimics the highly integrated natural gas system. Alternative Future 1 is considered to be the one we “know,” based on the history of Canada-U.S. natural gas trade relationships and industry and regulatory development. Alternative Future 1 also allows us to explore the first of the “conventional wisdoms:” “*Canada and the U.S. maintain the most seamless border in the world; there are no real issues for Canada/U.S. integration.*”
- *How does Mexico fit into the Canada-U.S. (CUS) market relationship and process?* This question constitutes Alternative Future 2, “Mexico Joins the CUS.” This future is considered to be the unknown, and captures the hypothesized integration of Mexico with its NAFTA partners as a result of the new trade regime itself and economic pressures, with a resulting opening in Mexico’s energy sector. Alternative Future 2 allows us to investigate the second and third of the conventional wisdoms: “*In general, the NAFTA will lead to a balanced commercial trade regime despite differing levels of development among the countries because the new regime will help to ‘bring Mexico along,’*” and “*Even though energy was not a significant component of the NAFTA, market reforms elsewhere in Mexico’s system will create pressure for significant restructuring of Mexico’s energy sector.*”

For both scenarios, we employed a ten-year time frame (to 2006) and used our issue categories of publicness, timing of restructuring, governance and economic development.

**Finding:** Our analysis of Alternative Future 1, *A CUS System for Electricity*, led to a qualified “yes,” within our ten-year time frame, electricity integration would proceed in a manner similar to that of natural gas. Alternative Future 2, *Mexico Joins the CUS*, failed under the criteria we established.

Our scenario analysis demonstrated that a number of uncertainties exist with respect to Alternative Future 1. These can be further delineated by examining the positions of key stakeholders. The following table summarizes our evaluation. A “+” or “-” is used to indicate relative direction, positive or negative, of influence of each group of stakeholders in each country. We found relatively few points of difference between Canada and the U.S. in direction of influence, but several instances in which influence, while in the same direction, might be stronger in one country than the other. Where this occurs, we use a “<” to signal less than or “>” to signal greater than, for Canada relative to the U.S. We also identified the key issues driving each group of stakeholders.

### Evaluation of Stakeholders' Interests

	CANADA	U.S.	ISSUES
Industrial Customers	+	+	Industrial customers in the CUS are positive forces for electricity restructuring. They benefit most from technology change that allows decentralized power purchases. They are also driven by historical pricing practices that favor other customer groups.
Ratepayers	+>	+	As with natural gas, if the imperative for electricity restructuring grows customer choice in residential markets may occur more quickly in Canada because of the longer, more intense winter heating season.
Existing energy industries (gas and electric utilities)	->	-	Existing electric utilities are barriers to electricity restructuring, but more so in the case of Canada's Crown corporations.
Potential new players ("energy entrepreneurs")	+<	+	Energy entrepreneurs, companies that will drive the direction and pace of restructuring, can play a more effective role in the U.S.
Federal vs. state/provincial regulators, policy makers	-<	-	In the CUS, decentralization is both a strength and a weakness but Canada could reach consensus among federal and provincial officials more quickly than the U.S. may among federal and state officials.
Environmentalists	->	-	Strategies, focal issues ("the North") and the level of conflict in Canada appear to be stronger negative influences. Many environmental groups in the U.S. view electricity restructuring to be a strike against policy-mandated alternative fuels and conservation programs long imposed on utilities. However, some groups see restructuring as essential for loosening the hold of public utilities that many view unfavorably (suggesting a possible positive direction of influence).

The preceding table merits further discussion.

- Industrial interests in both countries are striving to take advantage of power generation technologies that afford greater flexibility and cost advantages. This drive toward decentralized power creates an overall push for electricity restructuring among large users, the same force for change that led to open access for natural gas. Also like gas, industrial users have historically subsidized the cost of infrastructure and service for residential and small business customers. These subsidies have also been a strong incentive for industrial users to promote restructuring.
- Ratepayer interests in Canada and the U.S. are essentially the same – especially with regard to the costs of restructuring (cost of transition as well as the resolution of stranded costs associated with the decline in book value of assets that cannot compete in a restructured market). These issues are perhaps more sensitive in Canada and may require more political commitment for restructuring because of Canada's colder winters.
- Existing gas and electric utilities vary in degree of support for restructuring and integration but, again, public ownership in Canada differentiates stakeholder interests.
- The entry of cogenerators, independent power producers and other energy entrepreneurs into the electric power industry in the U.S. in response to federal initiatives (the Public Utility Resource Policy Act of 1978 or PURPA and revisions and the Energy Policy Act of 1992 or EAct) has

had a significant impact on the drive toward restructuring. It will be more difficult for these entrepreneurs to flourish in Canada with Crown ownership in place. Indeed, many U.S.-based energy entrepreneurs face barriers to entry in Canada because of the status of the Crown utilities.

- In both countries, there is a high degree of regulatory fragmentation. While federal authorities may be committed to electricity restructuring, and some provinces and states may follow (some have actually led federal reforms), others may lag behind.
- Finally, environmental interests in Canada are differentiated by the strength of ideological appeal: Canada, the “pristine North,” should be protected from development, especially when development is to support energy exports to the U.S.

Why did the Mexico scenario fail? While Alternative Future 2 is not impossible, at least with respect to more efficient utilization of continental grids, it is, in our assessment, highly improbable within the ten-year time frame we selected for analysis. Indeed, in building our second scenario we could not identify a reasonable time frame for Mexico’s full integration with the CUS system. This is an important realization, because for many studies on North American energy and evaluations of Mexico’s initiatives, and for the investment decisions that rest on these studies, timing is a crucial assumption. With respect to key uncertainties for Alternative Future 2, we concluded the following.

- Technology is a constraint in every dimension. Lack of technological options and the time required to introduce and implement new technologies will prolong the existing arrangement. Mexico is simply not at a point, and it is unlikely to be so in our ten-year time frame, where it can engage in integrated free trade. A considerable transfer of knowledge with respect to policy and regulatory approaches has taken place, but implementation is key.
- Even with open access in place for the Pemex gas pipeline system or for new pipelines, the NAFTA is a problem. Mexico reserved enough rights so that it can “close” its border with respect to energy trade.
- Attitudes toward the national monopolies and natural resource endowments create untenable political constraints.

The key uncertainties in each of our four issue categories overlapped our historical, economic, legal, political and technology disciplinary perspectives.

### **I. “Publicness”**

- *State ownership of resources (the national patrimony) and national monopoly control of resource production.* Mexico’s constitutional and related regulatory law protection, particularly of Pemex, is complex and difficult to unwind. There is little political support for privatization of either Pemex or CFE (or Luz y Fuerza, Mexico City’s huge electricity distribution company). While there are many efforts to improve operating performance of Mexico’s national energy companies, and many positive results, leaving the monopolies in place creates constraints that are likely to ultimately bear negative consequences. In the case of natural gas, with Pemex as the single supplier for the vast majority of the country, and with the favorable economics associated with production in Mexico as compared to the U.S. and Canada, development of downstream markets will be difficult. For electricity, the CFE’s position as monopsony buyer will constrain private investment in Mexico’s electric power sector.

### **II. “Governance”**

- *Centralized control of investment and decisions relative to infrastructure and resources.* Although Mexico has taken major steps with establishment of the CRE and creation of a regulatory framework (although revisions to the electricity rules are needed), decisions on

franchises and oversight remains at the federal level. This reduces flexibility and will slow the pace of development. “Political devolution” will ultimately increase tension between federal decision-makers and local interests.

### III. “Timing”

- *Pace of change is slow enough that opposing coalitions are able to restructure themselves.* Mexico’s energy sector, government and political regime type are all closely intertwined. Revenues from oil production have traditionally provided the major source of general funding for Mexico’s federal government. The fuzzy line between the federal government and Mexico’s major political party, the PRI, has created a direct link between Mexico’s political elites and petroleum sector. Strong political opposition exists to changing the status of Mexico’s national energy monopolies, and even to the changes most recently put into place. Because the pace of change is slow, these opposition coalitions may be able to restructure and survive even though Mexico’s political system is also undergoing historic reforms and faces increasing pressure to democratize.

### IV. Economic Development

- *Prevailing attitudes toward resource endowments and national monopolies.* The producer/consumer dimension, identified as a key uncertainty for the CUS in Alternative Future 1, also applies to Mexico, but even more strongly.
- *Regime type and overall economic growth.* Mexico is burdened with many of the same constraints to economic development and growth that other developing countries face as a consequence of centralization and control. While market reforms continue to progress, there is still suspicion of market-based economic policies.

We identified several stakeholder issues that have complex positive and negative effects for Mexico.

- **Political elites** are much more important in Mexico than Canada and the U.S. with respect to energy. A shift among elites toward market determination is essential for Mexico to integrate with the CUS model. This is happening, but slowly, and is generational change for the most part. A barrier to both general economic and energy reform, however, is the extent to which these strategies are debated at the elite level.
- **Industrial customers** play much the same role as in Canada and the U.S. in driving energy sector restructuring. However, there are strong relationships among Mexico’s largest industrial companies and the national energy monopolies which complicate analysis. Many industrial customers want better prices and service, but do not necessarily favor privatization of Mexico’s national energy companies.
- The external **financial community** may be a force for change. Worldwide competition is keen for private capital for energy infrastructure. Mexico is becoming much more alert to the views among international financial markets. However, typical of emerging markets, there is considerable resistance within Mexico to the idea that international investors might influence or even control internal policies.
- **Elite influence from northern Mexico** may be an interesting variable. Northern states are best positioned to integrate with and benefit from the CUS system, creating pressure for reform.

The role that northern Mexico might play in building pressure for integration leads to an aspect of our scenario analysis that is more probable – the growth of an active border “free trade zone” for energy. Certainly, the most vigorously sought after project opportunities are in the northern tier and it is likely that northwestern Mexico (Baja California) will integrate fully with the CUS system before the rest of the country. This possibility has been identified in previous work<sup>2</sup> and is due largely to the lack of

comparative advantages for Pemex in that region and the considerable relatively low cost supplies of natural gas and electricity available from California. For border electricity trade to take hold and flourish, however, the CFE will have to take a more favorable position toward wheeling.

### ***Risks to Our Scenario Outcomes***

The risks to our scenario outcomes are evident in our analysis. They can be summarized as follows.

#### Alternative Future 1: A CUS System for Electricity

Downside risks:

- Technological barriers associated with electricity restructuring in both countries are such that markets for power and CUS integration cannot be established within our time frame.
- Regulatory constraints and barriers, and the associated politics, are such that markets for power and CUS integration cannot be established within our time frame.
- Political disputes *within* Canada and the U.S. trigger a retrenchment in both natural gas and electricity marketization and integration.
- Political and/or trade disputes *between* Canada and the U.S. trigger a retrenchment in both natural gas and electricity marketization and integration.

Upside risks:

- Technological, regulatory, political or trade disputes are resolved (or do not emerge) such that electricity marketization and integration proceed unimpeded.
- Technological, regulatory, political or trade *breakthroughs* are achieved such that electricity marketization and integration proceed more rapidly than we have anticipated.

#### Alternative Future 2: Mexico Joins the CUS

Downside risks:

- Overall political and economic development in Mexico impedes or triggers a retrenchment against natural gas and electricity marketization and integration.
- Technological constraints impede marketization and integration.
- Marketization of gas and electricity takes hold, but trade disputes with the CUS impede integration.

Upside risks:

- Technological, regulatory, political or trade disputes are resolved (or do not emerge) such that natural gas and electricity marketization in Mexico and integration with the CUS proceed unimpeded.
- Technological, regulatory, political or trade *breakthroughs* are achieved such that gas and electricity marketization and integration proceed more rapidly than we have anticipated.

### **Barriers to Energy Integration in a Free Market Context**

Our scenario experiment revealed that, while a CUS electricity restructuring that parallels natural gas is plausible within the ten-year time frame for our analysis, many potential roadblocks exist and some could easily disrupt the process. The inclusion of Mexico into the CUS system is much more

problematic, and the flaws in conventional thinking about the NAFTA and its role in encouraging significant energy reform in Mexico are deeply apparent.

The following general considerations were drawn from our scenario analysis and evaluations.

- Regardless of outcomes and time frames specifically with regard to Mexico's inclusion, possibilities for joint ventures with Pemex and/or CFE continue to exist. Many Canadian and U.S. firms are seeking these out as solutions to an otherwise difficult investment and operating environment. In addition, nothing in the NAFTA or other underlying conventions precludes joint ventures between Mexico's national energy companies and Mexico's industrial groups or other foreign investors. Nevertheless, successful joint venture programs could ease pressure to reform Mexico's national monopolies, especially with regard to the difficult political solutions to their constitutional status.
- Natural gas deliverability issues in Canada and environmental opposition directed toward exports could change entirely the picture for North American gas. A political constraint associated with Canada's role as energy supplier to the vast U.S. market, such as public opinion swaying against natural gas exports, or technical supply constraints in either Canada or the U.S. could alter Mexico's position. Such an opening conceivably might allow Pemex to build a vigorous export program for gas and could bring Mexico's interests much more in alliance with those of the CUS with respect to management of pipeline systems and, perhaps, upstream policies. Likewise, an opening for electricity wheeling in Mexico would create pressures for greater access throughout much of the North American grid.
- As we conclude this project, Mexico's general economic situation appears to have improved from the situation in 1995-1996 following the most recent peso devaluation. However, until fundamental reforms take hold, Mexico will continue to face fiscal pressures. Given the size of Mexico's energy sector, it is a logical place for policy reforms and therefore political conflict. Many threats exist on the horizon, from volatility in world oil prices to fiscal pressures as Mexico approaches presidential elections in 2000 that could hamper progress. In our view, it is only a deeper commitment to economic liberalization and "marketization" that will allow Mexico to successfully navigate these challenges.

Our scenario analysis suggests much about potential barriers to continental marketization and integration of natural gas and electricity systems. In combination with our baseline assessment, we conclude that the following five conditions bear the most significant implications for North American natural gas and electricity integration as we have defined it in our study.

- *Regulatory harmony and regulatory technology transfer.* Regulatory harmonization is strongest between Canada and the U.S., through both formal and informal processes that facilitate diffusion of approaches. There is no overt policy or process driving harmonization, nor do we suggest there should be. The relationship between regulatory institutions and governance in each country has a significant effect. Policy harmonization is weaker as federal level institutions in Canada and the U.S. decline in importance relative to market-based solutions, and internal and external politics impact federal agencies in all three countries.
- *Regionalization.* The prospect of integration via interconnected regions is very strong. Local politics plays a strong role at the regional level with often negative implications. Regionalization may be most important in expanding opportunities along the U.S.-Mexico border.
- *International trade.* For each of our "conventional wisdoms," we found the following. (1) "Canada and the U.S. maintain the most seamless border in the world; there are no real issues for Canada/U.S. integration." We found this to be mostly true but with several current and potential sources of conflict related to views within each country regarding energy exports and imports.

(2) “In general, the NAFTA will lead to a balanced commercial trade regime despite differing levels of development among the countries because the new regime will help to ‘bring Mexico along.’” Since the signing and implementation of NAFTA, the situation in Mexico has become more volatile and unpredictable rather than less. Overall, the NAFTA does appear to set reasonable ground rules for continued restructuring and increased efficiencies in Mexico’s economic sectors, including energy to some degree. What was not given adequate appraisal, perhaps, was the depth of the political upheaval that would accompany the taking apart of Mexico’s six-decade old dependency by its political system on national economic assets, especially in the energy sector. Democratic institutions are needed that can facilitate both the operation of market mechanisms as well as the orderly transfer of political power. (3) “Even though energy was not a significant component of the NAFTA, market reforms elsewhere in Mexico’s system will create pressure for significant restructuring of Mexico’s energy sector.” The new trade regime simply does not provide enough support for the truly tough steps that must be taken *if* Mexico’s goal is to have a market-based energy sector (and there is some doubt as to the nature of Mexico’s goals in this regard).

- *Investment, ownership and anti-trust controls.* All three countries have large public enterprises in their energy sectors, and private enterprises that can wield market power if not disciplined (preferably in a light-handed manner). The difference between the CUS and Mexico is that, in the former, the pendulum is swinging in favor of greater balance between consumer and producer interests, driven by consumer expectations that can be expressed freely in the political marketplace. Our evaluation of stakeholders’ interests fully demonstrates the gap between the CUS and Mexico in this regard.
- *Politics and economic development.* The relative positions of the three countries with respect to economic development and maturity of their energy sectors are clearly linked. However, we found a number of situations in which market mechanisms are emerging where before the only solution would have come from government. To us, this signifies that other solutions are available and that economic determination may do more to stimulate economic and political development in North America, even in our poorest neighborhoods, than we could continue to achieve from our existing arrangements.

## **Recommendations – Paths around Key Barriers**

We identified both barriers and break-throughs that have occurred since the start of our study. Our analysis and results suggest several recommendations that could enhance the prospects for more market oriented and integrated North American natural gas and electricity systems that can support economic development and prosperity on the continent. Some of our recommendations are controversial, but we offer them in the spirit of our overall contribution and encourage debate and the exchange of ideas.

- Alter the status of Mexico’s Secretary of Energy.

As we publish this report, Mexico has in place the third Secretary of the current Zedillo Administration. Any individual holding this position in these times is subject to enormous pressures and political conflicts, most of which are unresolvable in the current climate. Nearly from the moment of appointment, however, the Secretary becomes compromised by his duties as chairman of Mexico’s national energy companies. This renders SE ineffective as an agency and removes neutrality from policy making. We recommend that the status of Secretary be altered to remove these responsibilities and to create a more effective, neutral office.

- Work to attain consistency in goals and objectives for energy policy and regulation.

The net benefits that may stem from harmonization of energy policies and regulatory frameworks cannot fully be achieved, even through informal channels, unless there is consistency in approaches within individual jurisdictions. This is difficult to attain because it requires resolution to fundamental differences of opinion within the three NAFTA countries, and their sub-jurisdictions, regarding reliance on markets and the role of government. At any point in time, commitment to either philosophy will be influenced by economic, political and social conditions outside of the control of policy makers, regulators, firms or consumers, and long-term patterns can revert or become cyclical. National policy institutions can play a role in educating consumers and lawmakers on the range of alternatives and encouraging balanced debate on all sides of these issues. The counterweight is that national energy policy institutions have a tendency to become too politicized to be effective, so that viable options should be created or supported.

Policy and regulatory consistency seem to have been weakest in Mexico. We suggest that a hard look be taken at the ultimate goals and objectives for energy sector reform. We cannot realistically recommend privatizing Pemex or the CFE. The political and social status of these companies makes such a suggestion meaningless, although a wealth of evidence suggests that private activity in Mexico's energy sector would yield many more benefits than can be achieved if the core businesses remain reserved for Pemex and the CFE. However, it seems to us that exposing investors to a situation in which market strategies are constrained by the presence of national energy monopolies does not accomplish much either. It may be that the only achievements are diminished revenues for the national companies and underperforming private investments because of the efforts by the national companies to retain control of their best customers. If the status of the national energy companies is something that will be preserved, then Mexico's policy and investment communities and their partners in the U.S. and Canada should be pragmatic about what can best be accomplished and strive for effective solutions.

Canada and the U.S. are not free of policy and regulatory inconsistency. The Crown corporations in Canada and the federal power authorities in the U.S. pose conflicts similar to those in Mexico. The savings and enhanced flexibility for customers achieved with greater competition must be weighed against the inevitable downward pressure on revenues as entrepreneurs chip away at markets formerly reserved for these government enterprises.

- Overcoming NAFTA deficiencies.

Many researchers by now have pointed to the many deficiencies in the NAFTA with respect to energy and the difficulties that these deficiencies lend to the new regime. In our view, the deficiencies within NAFTA lie not with specific terms for energy trade but with the failure to provide broad principles for continental energy marketization and integration. Opening NAFTA to re-negotiation on principles would likely yield little return since the relative positions of the three partners with respect to energy have not changed much, if any, and it was the failure to achieve agreement on principles for energy that nearly stalemated the negotiations. It also appears that attempts to re-negotiate specific terms, for example accelerated phase out of tariffs on gas imported by Mexico, have little chance of success. At the same time, sharp disputes related to energy matters could jeopardize other aspects of the new NAFTA regime. We recommend, therefore, that the NAFTA not be opened for re-negotiation, since the overall benefits would likely not exceed the costs of doing so, but that during the normal course of review and renewal efforts be made to build dialogue on principles for energy marketization and integration. In light of our previous recommendations regarding consistency in approaches, however, it is clear that much work has to be done before a fruitful exchange can take place.

- Emphasize regional solutions.

We concluded that regionalization offered some good news, and that was in the development of energy market regions that interconnect into continent-wide systems. To the extent that regional solutions can be encouraged, then the outlook for national or continental ones becomes more positive. For Mexico in particular, this approach may be a constructive way of circumventing barriers to marketization and integration. We also noted earlier that the U.S.-Mexico border has been termed a place for experimentation.<sup>3</sup> Based on separate work undertaken by the Energy Institute, we recommend that pilot projects be undertaken to establish whether co-operatives and development bonds may provide useful tools for energy infrastructure development. An assortment of legal/institutional changes would be required, but all are achievable.

1. Constitutional provisions to allow decentralized financing in Mexico would be necessary. This is one of the biggest hurdles to a border region approach, but eventually decentralization must be achieved if Mexican businesses and communities are to flourish.
2. Regulations enabling the formation of co-operatives (Mexico's 1993 regulations allowing private investment in electric power generation) should be strengthened and clarified and terms and conditions for the creation and performance of co-operatives established. Other countries, notably the U.S., have facilitated the development of co-operatives. The U.S. used the rural co-operative system effectively to electrify remote towns and farms. Insured low interest loans would allow for infrastructure improvements in areas that are far from the Pemex and CFE, or U.S., systems.
3. Municipal utility districts, heavily used in Texas to provide services for new residential areas and industries, could be adapted for the purpose of providing energy services. Strict rules and codes of conduct and enforcement would be essential in order to ensure that MUDs operated profitably without opportunities for fraud.
4. Mexico should create a municipal bond market that would allow municipal jurisdictions some self-determination in funding infrastructure improvements, including municipal energy systems. This step will take time as all of the institutions that facilitate "muni" markets in other countries would have to be created in Mexico – bond underwriters, rating agencies, insurers, primary and secondary markets for trading, income tax provisions for interest free income to make munis attractive investments, and so on. Again, skills and experience from Canada and the U.S. could be easily shared with Mexico to build these institutional assets.

Any or all of these options could be experimented with among any of the rapidly growing cities and towns along the U.S.-Mexico border, borrowing heavily from Canadian and U.S. expertise and with a careful look at how other emerging markets (cases exist in India, the Philippines and Colombia) have deployed these strategies, successfully or not. These options would ease pressure on Mexico's national companies and hasten development. We suggest that a ready source of lending exists with the North American Development Bank (NADBank). The NADBank has come under criticism for a low level of activity since its creation with the NAFTA. We recommend that the charter of the NADBank be revised to allow lending for pilot energy infrastructure projects within the U.S.-Mexico border region consistent with the Bank's mission to encourage environmentally sound infrastructure improvements.

- Regulatory/policy gap on reciprocity.

We mentioned earlier the problems with reciprocity. Structures already exist for constructive dialogue on these issues (bilateral meetings between the national energy agencies, the NARUC and CAMPUT associations, and so on). We suggest that working groups within these structures be formed to evaluate the seriousness of reciprocity issues and workable dispute mechanisms before they become impediments to energy trade and integration.

- Regulatory restructuring

We have recognized in this report that the regulatory arena has not been immune to the forces of change that have impacted the natural gas and electricity industries. Not only are regulators and companies experimenting with more innovative approaches (market-based rates for transportation, incentive ratemaking, proactive technical conferences, etc.). Many regulatory bodies are also attempting to streamline their own operations, hear cases more judiciously, enable more efficient processes. These steps need to continue, but our survey of the North American energy situation suggests other necessary steps to be taken.

1. All regulators operate within the narrow confines of the case and decision at hand. We recommend that regulatory agencies need to reorganize staffs and processes so that they can be more “value chain” oriented, understanding the extent to which decisions in one portion of the gas and electricity businesses can impact supplier and consumer transactions in many other segments of these increasingly convergent industries.
2. We acknowledged that the federalist systems in Canada and the U.S. have both positive and negative ramifications for gas and electricity integration. Many levels and layers of regulatory control exist, particularly in the U.S. We recommend that a deeper regulatory restructuring should take place, perhaps even to rationalize institutions, like the public utility commissions, that in some cases have existed for about 100 years. In our view, with regional market development and the existence of regional reliability councils that entail Canadian and U.S. involvement, reorganization upward to regional-level institutions should be seriously evaluated to gain “political economies of scale.”<sup>4</sup> We recommend that laws and regulatory approaches devised during the infancy of the gas and electricity industries be thoroughly reviewed and revised or repealed accordingly based on the current, high technology, high value-added and increasingly competitive nature of these industries.
3. In contrast to (2), Mexico should decentralize its regulatory apparatus or at least provide real outlets for sustained and meaningful input from state and municipal governments. An unwarranted risk is posed to investors should Mexico’s political devolution extend to a desire for local control over energy infrastructure projects when a greater effort could be made to accommodate local viewpoints and preferences.

- Education and technology exchange.

It is to the benefit of all stakeholders within the North American gas and electricity marketplace to be as well informed as possible of all options. Markets cannot function properly unless information is accessible. We suggested earlier that national energy policy bodies might have a role to play in this regard. Regulators as market facilitators play a role in reducing information asymmetries (recognizing, however, that information represents competitive advantage). Since the beginning of the deregulation movement in the U.S. in the 1960s and parallel trends in Canada, consumers in both countries have become much more astute with regard to what the market can offer them. Consumers in Mexico do not have this privilege unless they have had opportunities to travel or work outside of Mexico. In addition, Mexico’s elite, paternalistic institutions have stifled consumer preferences. Consumer education can be an effective agent of change and once consumers detect that choices exist it is difficult to return to the status quo. Our analysis suggests that this will be true throughout North America, but with variations in timing given where the starting points for the respective NAFTA partners. Our study also highlights the importance of technology to properly functioning natural gas and electricity markets in North America, and the barriers to Mexico’s full integration posed by technology deficiencies in that country. We also learned the limits to what private firms will share if they do not have profit incentives. Some years ago it was suggested that “technology dyads” between the U.S. and Mexico could go a long way toward resolving mutual suspicions and ensure long-term

energy security for both. There is evidence that something like this filters through the relationships among the NRCan, U.S. DOE and SE. We recommend that these initiatives should extend more deeply into the NAFTA relationships, and that there may be a proper role for Canadian, U.S. and Mexican universities to play in this regard.

**NORTH AMERICAN ENERGY INTEGRATION**  
*The Prospects for Regulatory Coordination and  
Seamless Cross-Border Transactions*

**PART I. INTRODUCTION AND OVERVIEW**

**Purpose of Our Study**

In December 1995, an interdisciplinary research team led by the Energy Institute at the University of Houston's College of Business Administration embarked on a team-based interdisciplinary research effort. Our project goal was to add to the general understanding of North American energy relationships in consideration of the North American Free Trade Agreement (NAFTA) regime and the momentous changes taking place in the natural gas and electric power industries. The purpose of undertaking such a large task was to provide an objective, multidisciplinary, university-based perspective on problems that are receiving wide scrutiny in industry, government and research circles, not only in North America but worldwide. Through our research, we hoped to make a number of contributions.

- We conducted a thorough analysis of many complex and multi-dimensional issues associated with North American energy integration, including some that have not received much, if any, attention.
- We used scenario analysis to identify key uncertainties and focused our respective disciplinary perspectives on these key uncertainties, as opposed to the more general use of scenario analysis for forecasting and investment decision making.
- We implemented the concept of “regulatory technology.” This encompasses the various rules and norms (“soft” technologies) used by regulatory authorities and which can be defined and studied. The notion of a regulatory technology was defined in the past<sup>5</sup> but, to our knowledge, never implemented in analysis.
- We developed specific recommendations drawn from our individual disciplinary evaluations of the outcomes from our scenario analysis.

Our effort can best be described as a “thought experiment.” For the most part, the physical parameters of the North American gas and electricity systems are fairly well known, and there are any number of studies that attempt to forecast and predict supply/demand balances into the future. Our premise was much more basic. Through the evaluation of current information, in depth interviews and a well-thought-out scenario exercise we hoped to uncover barriers to the free trade of natural gas and electricity via the ultimate integration of physical networks and complementary policy and regulatory practices in the NAFTA zone. Once those barriers were revealed, recommendations could be made and acted upon. Our topic of study is a moving target – nearly everyday or week events occur in North American gas and electricity markets that alter expectations, perceptions and potential future pathways. Our challenge was to attempt a longer term view and separate hype from sound strategies, isolate short term deviations from long term trends and identify and, hopefully, avoid the array of biases that infiltrate viewpoints about North American energy relationships.

This report contains the results of our research. It is a frank assessment of the situation for North American natural gas and electricity, from perspectives that are often not considered or are treated

only lightly. Throughout this document, we include information gleaned from the numerous interviews we conducted, as well as information gained through the June 1996 North American Energy Roundtable. We treat all of this information anonymously, but do include the names of individuals and organizations in the Reference section to our report. All of the conclusions, their implications and interpretation of information gathered to support our analysis are the product of our own thought and evaluation.

## **Why the Natural Gas/Electricity Emphasis?**

In designing our study, we laid out as an important criterion that our focus would be on natural gas and electricity. We have several reasons for this emphasis. One is the inexorable movement toward natural gas, not only in North America but also around the world, because it is a relatively clean-burning fossil fuel. In North America we have abundant natural gas resources. Acceptance of this condition, still strongly debated in some circles, suggests an energy future that is quite different from what was envisioned during the early to mid 1970s when natural gas was thought to be physically scarce.

Another reason for limiting our study to natural gas and electricity is the enormous change unfolding in two industries that have been dominated by public interest issues and public utility regulation and policy. Since the late 1970s, Canada and the U.S. have engaged in a massive restructuring of their natural gas sectors, in order to increase the opportunities for competition and market-based transactions and minimize monopoly power. Now, the situation in both countries is quite similar (a review of historical and current policy and regulatory conditions is provided in the Appendix).

- The production of natural gas is competitive.
- Long-distance inter-jurisdictional (meaning across national, state or provincial boundaries) transmission of natural gas is “contract carriage,” what we term “open access” but which simply means that pipeline operators must provide comparable and nondiscriminatory service to any shipper, and strong third party marketing functions have evolved.
- Local distribution companies (LDCs or local gas utilities) are being pushed to adopt more competitive standards and allow contract carriage on their systems. This latter experiment is much more widespread and aggressively pursued in Canada; progress in the U.S. is much slower and resistance is high.
- The U.S., with Canada following, now is moving toward a similar, and clearly more wrenching, restructuring for electric utilities driven in large part by the growing influence of lower-cost natural gas-fired electricity generation and the increasing convergence of the natural gas and electricity industries.

Mexico also is enacting changes for natural gas and electricity that are historic. Mexico’s changes parallel those in Canada and the U.S. but also contrast in one important respect: federal control of Mexico’s energy sector is being preserved and, in a sense, strengthened.

- In 1993, Mexico adopted rules for private investment in electricity generation, but its national electric monopoly, Comisión Federal de Electricidad (CFE), retains control of purchases, transmission and distribution of electricity generated by private facilities. Like many developing countries, the electricity infrastructure in Mexico is more advanced than for natural gas.
- In 1996, Mexico elected to introduce competition into natural gas pipelines, distribution and storage, but its national oil monopoly, Petroleos Mexicanos (Pemex) retains control of natural gas production and processing and has considerable power in transportation, industrial and electric power generation markets. An interesting issue for Mexico and other countries is the degree to

which “downstream” segments (like pipelines) can be subjected to market forces while natural gas production “upstream” is not. The consequences for end-use, like power generation, can be substantial.

- Also in 1996, Mexico adopted policies and a regulatory structure at the federal level (the Comisión Reguladora de Energía or CRE) that is similar to its NAFTA partners (the National Energy Board or NEB in Canada, Federal Energy Regulatory Commission or FERC in the U.S.). The CRE also has authority over local infrastructure projects and tariffs in addition to national infrastructure and tariffs. This compares to the U.S. and Canada, which have highly decentralized federalist systems with state and provincial regulatory commissions that have authority over local (intrastate and intraprovincial) infrastructure and tariffs and that were established well before the NEB and FERC.
- The CRE, which also is charged with the sale of certain assets to private interests, has proceeded with auctions for local distribution franchises and bids for power projects (a review of activity in Mexico is provided in the Appendix). A second issue for Mexico and other countries is whether the strategy of vesting newly created regulatory authorities with privatization responsibilities may raise conflict of interest possibilities or affect regulatory credibility.
- Fuel choices for power generation are increasingly market driven in the U.S. and Canada (save for specific issues with Canada’s Crown corporations, addressed later in this report). In Mexico, fuel choices for power generation are subject to national policy.

Thus, the emphasis on gas and electricity markets is justified by both the obvious potential market growth, and by the recent changes in policy and regulatory structures that anticipate such growth.

## **Central Question and Hypothesis**

North American energy relationships have reached a point where discussion of integrated energy systems is no longer idle talk. But the idea of energy “integration” is a complicated one. Certainly with regard to physical systems, integration already exists. Crude oil and petroleum products move relatively freely among Canada, the United States and Mexico. Cross-border interconnections for natural gas and electricity are in place. In other dimensions, however, integration is less easily defined. In the policy and regulatory dimension, each sovereign nation (Canada, the U.S. and Mexico) maintains separate federal level jurisdictions and, in the case of Canada and the U.S., separate provincial and state jurisdictions for energy. There is no “continental authority” or coordinating body nor is there any attempt or, as far as we can tell, any desire to create one (nor do we make that recommendation in our study). There are, however, informal arrangements that exist in some important areas.

- Regulatory approaches to natural gas and electricity in Canada and the U.S. are strongly parallel. In both countries, organizations exist that coordinate across provincial and state regulatory commissions.
- National energy agencies in Canada (Natural Resources Canada or NRCan) and the U.S. (Department of Energy or DOE) have maintained communication and coordination through bilateral meetings. The strength of this relationship has varied over time, and is currently weak given the reduced role of federal policy making for energy in both countries.
- Mexico has been drawn into these informal networks, both through the CRE and Secretaría de Energía (SE).<sup>6</sup>

The question of North American energy integration resides within a broader context of economic, legal/institutional, business practice, and sociopolitical relationships. “Integration” can be thought of

as layers of concepts – an idea (shared vision), a set of parallel institutional arrangements across a number of sectors and domains (harmonization), actual combinations or linkages that imply interdependence – increasing in complexity as the relationships become more sophisticated. A confounding and at the same time illuminating characteristic emerges from any brief reflection on North American relationships. Canada and the U.S. are more alike (though there are intriguing differences that are often misunderstood and therefore de-emphasized) while Mexico is very different. And yet, the three nations, despite their differences, are bound together in a commercial trade regime, the North American Free Trade Agreement (NAFTA), that implies shared vision, parallel institutional arrangements and at least some actual combinations or linkages but offers little basis for cross-border energy trade and policy coordination arrangements.

With this in mind, our research team set out to explore two questions that are growing in importance.

- *What are the prospects for harmonizing policies and regulations affecting natural gas and electricity across the three North American Free Trade Agreement (NAFTA) countries?*
- *What are the implications of harmonization for seamless transactions?*

These questions are important because of certain presumptions and attendant expectations that have arisen with the NAFTA, of which the following three ideas have achieved prominence.

4. “Canada and the U.S. maintain the most seamless border in the world; there are no real issues for Canada/U.S. integration.”
5. “In general, the NAFTA will lead to a balanced commercial trade regime despite differing levels of development among the countries because the new regime will help to ‘bring Mexico along.’”
6. “Even though energy was not a significant component of the NAFTA, market reforms elsewhere in Mexico’s system will create pressure for significant restructuring of Mexico’s energy sector.”

Of interest to all actors in the new marketplace is how much time must pass before these expectations are realized, if indeed they are. We assume in our study that ultimately, over some time frame, we will witness the creation of and reliance on market institutions of some form in Mexico. We expect that, at some point, relatively open, three-way commercial trade flow for gas and electricity will evolve within the NAFTA zone that yields positive net benefits. Timing hinges on the various impediments that exist and the strength of those impediments. In general, transactions across the Canada/U.S. border appear to be relatively seamless. Regional gas markets in Canada and the U.S. are tightly bound together given our similar stages of development, infrastructure (including policy and regulatory institutions) and our reliance on market institutions. These conditions are less apparent for electricity and thus the outcomes are less clear. Furthermore, while Mexico has taken some important steps, which we acknowledge in our study, we also can see the rather profound difficulties and constraints that are in place to Mexico’s full integration.

Our assumption of “positive net benefits” associated with continental energy integration bears further discussion. Is energy integration good or bad? As with anything, there are pros and cons. Certainly, from a customer point-of-view, the notion of access to cheap, reliable gas or electricity via continental grids managed by effective, flexible arrangements is appealing. Plentiful resources produced in reasonably well working markets yield numerous economic benefits. From a producer point-of-view, this is perhaps not the easiest of times in spite of potential access to new or larger markets. Competition impacts operating margins, and many natural gas basins or power generation facilities are not well positioned to compete. With regard to institutional arrangements (the relationships among policy and regulatory bodies, energy suppliers and energy consumers), existing structures and how they function may not be compatible with highly integrated energy systems. Coordination of regulatory approaches, facilities for dispute resolution, local versus national control, the ability to

mesh policy and regulation with the particular needs in each country, are all significant issues. Exploring the balance between consumer and producer surplus, and the costs and benefits associated with changing existing institutional arrangements, are beyond the scope of our study. Given that we take as our argument that approximating a competitive market model is preferable, then in essence we are concerned here with constraints to that model.

The central question for our study, therefore, is multidimensional and contingent upon a number of things, from current conditions in the gas and power industries to the systems of government among the NAFTA partners to whether the NAFTA itself helps or hinders the evolution of an integrated continental energy market. We can break down our central question into two components.

1. Will the process for electricity restructuring in the U.S. and Canada mimic the transformation experienced with natural gas? Importantly, this question rests on our assumption that, for all intents and purposes, the “CUS” can be treated as an integrated market for natural gas (henceforth we use the CUS acronym to indicate the integrated Canada/U.S. systems). Secondly, we phrase the question in this manner because of our underlying argument that for the full extent of benefits from cross-border trade and integration to be achieved, greater access within the CUS system will be required.
2. How does Mexico fit into the Canada-U.S. (CUS) market relationship and process? Our main interest lies in whether Mexico will follow a path similar to the CUS in opening its gas and electricity sectors, and the implications if Mexico pursues a different strategy.

We used these two questions for our baseline evaluations and scenario analysis.

## **Our Approach**

During summer and early fall, 1996, the study team engaged in extensive literature collection and preliminary interviews to collect information and perspectives from industry, government and academic experts. We launched our data collection effort with the North American Energy Roundtable on June 6. During a full day of discussions, we were able to establish the key issues and directions for our analysis. We conducted follow-up interviews in Mexico City, Ottawa and Washington D.C. and Calgary. We also met and spoke with state regulatory experts in Texas and California.

This study, being funded by an interdisciplinary scholarship program, must necessarily rest on the combination of disciplines and perspectives within the research team. However, while there is much value to be gained from bringing different disciplines to bear on a research problem, there are also barriers that are inherent in such a process. Consequently, we elected to use scenario analysis as a technique for breaking down disciplinary boundaries and to synthesize our thinking. Our methodology is as much a subject of this research as it is a means of tackling the research problems. We used our graduate student team to prepare for and assist in leading our scenario analysis in December 1996. After the full-day exercise, we spent the subsequent months testing our results through follow-up interviews and tracking developments in North American natural gas and electricity. The ultimate test of our study outcomes will be how events unfold in North American gas and electricity markets over the next few years.

Apart from blending our respective disciplines with the scenario analysis approach, we used our individual perspectives to establish the basic parameters for our investigation and to inform our scenario analysis and outcomes. Part Two describes our evaluations.

## PART TWO. HISTORICAL, ECONOMIC, LEGAL, POLITICAL AND TECHNOLOGY CONSIDERATIONS

### Historical and Economic Perspectives

The general history of economic, political and legal relationships on the North American continent permeates any assessment of past, present or future energy relationships. Both the general history, as well as many specific events related to the energy sectors of the individual countries and energy trade, have been extensively documented and studied. In addition, the economic parameters of the natural gas and electricity industries and North American energy trade are fairly well known. We did not replicate or attempt to re-assess past evaluations. Rather, we used historical experience and our general knowledge of the market economics associated with natural gas and electricity to define the parameters for our study and scenario analysis. The Appendix contains a short review of natural gas and electricity industry and market developments as well as historical to current trends in policy and regulatory restructuring.

The framework for our study is a simple model of economic and regulatory change that reflects the process of industrialization and accompanying social, economic and political dynamics. We term this process “marketization,” which involves creating the rules and norms for a properly functioning marketplace, as shown below.

**Figure 1. Marketization**

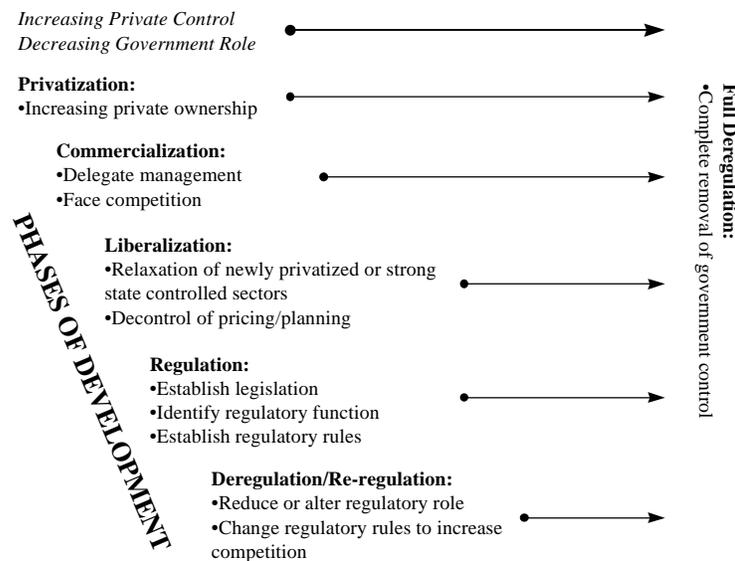


Figure 1 above suggests that different countries may begin from different points in the marketization process and, at any one time, they may be positioned at different points in the process. The location of a country’s position hinges on many factors, including the maturity of the industry in question (including infrastructure), basic legal and economic systems and so on.

For the most part around the world, the provision of energy either for domestic use or export is carried out by state-owned enterprises (SOEs) that are self-regulated and heavily intertwined with national budgets and socioeconomic and political agendas. The use of regulation to moderate the activities of private actors and the ultimate shift toward market-based solutions in the U.S. and

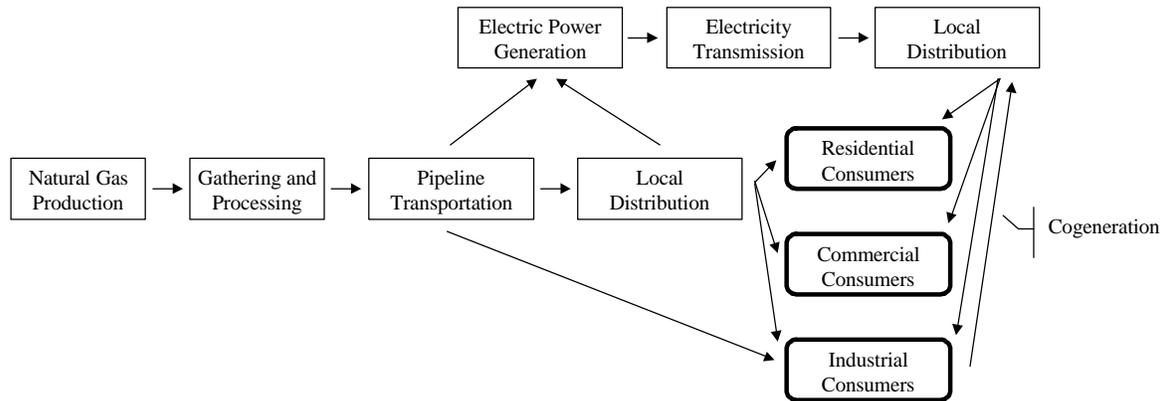
Canada is unique among world regions. The U.S. stands out in particular with its strong tradition of private ownership of natural resources. Canada, like other countries, maintains a strong government presence with regard to the ownership and control of natural resources. In both countries, the construction and operation of pipelines, power plants, electricity grids and other facilities have been dominated by private companies as franchised monopolies heavily regulated by independent federal and provincial/state boards and commissions. (Canada's Crown corporations, like Ontario Hydro and Hydro Quebec, and the U.S. federal power authorities are some of the exceptions; refer to the Appendix for more detail.) The transition that we are experiencing now, to introduce and strengthen competition in natural gas transportation and distribution and electricity generation, transmission and distribution, actually will result in conditions similar to what existed before the rise of economic regulation. The first LDCs and electricity companies in the U.S. and parts of Eastern Canada operated in an open environment of a competitive free-for-all. Had the regulation of franchised utilities never emerged as an option it is quite possible that market forces would have intervened to discipline these emerging industries. The rise of regulation from the mid-1800s to the 1930s coincided with other forces and drivers taking hold. These included the definition and acceptance of the notion of "public service in the public interest," an increasing suspicion and wariness of "big business" (the early utility holding companies were some of the biggest), the fear that "destructive competition" would prevent society from achieving the full benefits of these new and incredibly powerful options for the provision of energy. But regulation also solved a problem: how to get high-risk infrastructure in place in a dynamic business environment that created a great deal of uncertainty for investors with respect to profitability of the nascent natural gas and electric power industries.

A basic premise underlies the transition for natural gas and electricity, that *technology drives industry economics that in turn drive policy*. Acceptance of monopoly was much more widespread when the natural gas and electricity industries were in their infancy. The need to deal with the risk associated with infrastructure development and the lack of options for market transactions restricted other alternatives. The early institutional arrangement was thus one of licensed monopoly franchises with public utility regulation that provided stable rates of returns for investors and shareholders and also attempted to mimic a competitive price for customers. Thus, for example, regulators franchised interstate pipelines and allow those pipeline monopolies to act as a merchants, controlling the acquisition of natural gas from producers and the sale of gas to LDCs, and franchised electric utility monopolies to produce, transmit and distribute electricity. Technological advances that reduced the unit cost of infrastructure development (such as the advent of arc welding for pipeline construction), technological options to the existing infrastructure (such as the development of highly efficient natural gas turbines for electricity generation) and new "high technology" businesses (computer information systems that enable the sophisticated management of transactions, dispatch and control and risk) have completely altered the old equation. The tendency now is to unbundle energy services, allowing suppliers and customers to interact in a number of ways and to reducing the regulated monopoly to the physical infrastructure itself, while at the same time regulating through the use of market incentives. Technology-altered industry economics and has forced policy and regulatory institutions to adapt. It happens that this general process underlies not only the transitions for natural gas and electricity, but also for telecommunications, airlines, trucking and banking, all industries which have experienced similar restructurings and from which there are many parallels for natural gas and electricity.

The technology drives industry economics drives policy path is important because of its fundamental linkage to our basic assumption that market based systems are the most desirable situations for society at large. They provide in roughly equal proportion both profits to efficient producers (those who can drive their costs of production furthest below the competitive market price) and savings to consumers (the difference between the maximum price they might be willing to pay and the competitive market price, and certainly between a monopoly price and competitive price). The

critical aspect of these relationships for the “modern” (today’s) natural gas and electricity industries is in how the benefits of the natural gas and electricity “value chains” are provided by producers to their ultimate consumers. A simple value chain is shown below.

**Figure 2. A Simple Natural Gas-to-Electricity Value Chain**



Consumers cannot easily use natural gas directly out of the producing field. Consumers may choose to provide their own electricity via small-scale systems (and the prospect for distributed power may increase access to electricity in this fashion), but it is much more typical for consumers to receive their electricity from the distribution grid. Industrial consumers have many more options for their energy service, especially as the tendency to bypass local gas utilities has grown and with the evolving bulk power market (refer to the Appendix). For all intents and purposes, the value chain is necessary in order for consumers in any category to benefit from natural gas and electricity for quality of life and economic productivity. The concern becomes how best to build the value chain. The history of economic experience suggests that it may be best to facilitate value chain development through private, competitive markets. This enhances the possibilities for consumer savings, and provides firms with opportunities and incentives to operate across as much of the value chain as they are able to do so but with competition constraining producer profits below monopoly levels. Regulation can then be limited only to those occasions (mainly associated with transportation and distribution infrastructure) where the potential for monopoly power is highest. The ability to pursue this strategy is aided by technology development and deployment, and by policy and regulatory approaches that support value chain creation.

The technology drives industry economics drives policy path does not occur in a vacuum. Much of the pressure for change comes from energy customers, both businesses and individuals, who perceive savings and increased efficiencies from competitive supply arrangements. How this plays out will dictate, to a large extent, the future North American gas and electricity marketplace.

It is important to recognize, in view of the variable conditions and imbalances that are in place in North America, that energy integration might unfold in several different ways. First, as already acknowledged, Mexico is at a much different point developmentally than the U.S. and Canada. While we largely have our infrastructure in place, so that strategies revolve around maintenance and expansion, Mexico has substantial infrastructure needs particularly in impoverished and remote rural regions. Second, although the U.S. and Canada have experimented with government owned or controlled energy enterprises (to a much larger degree in Canada) and while these enterprises pose peculiar problems and constraints, neither country has relied solely on SOEs for the provision of energy goods and services. Mexico contrasts directly in this regard. Third, while provincial Crown

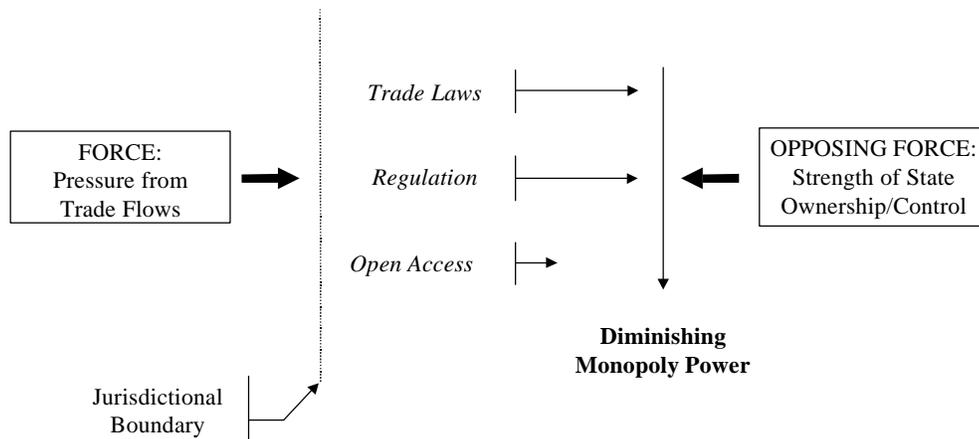
government ownership of resources exists in Canada, resource extraction and supply are competitive endeavors. The starkest contrast between Mexico and its partners is the constitutional reservation of oil and gas to the state on behalf of the Mexican people (the patrimony). The available pathways for North American energy integration, therefore, are distinguished by the fundamental characteristics of how the respective energy sectors are organized. This can be illustrated as follows.

**Table 1. Generalized Energy Sector Organization**

<b>Energy Sector Organization</b>	<i>Regulated Monopoly</i>	<i>Regulated Competition</i>	<i>Free Market Competition</i>
<b>Assumed Efficiency</b>	Lowest	Higher	Highest

The reality in North America for some time to come is cross-jurisdictional trade involving regulated monopoly and regulated competition. This implies a strategy with respect to monopoly of authorized entry and open access in order to facilitate trade, introduce competition and increase efficiency gains. The condition of cross-jurisdictional trade involving regulated monopoly and regulated competition also implies a process model for facilitating trade flows, as shown below.

**Figure 3. Process Model for Facilitating Energy Trade Flows**



In Figure 2, pressure from trade flows (actors seeking greater efficiencies) triggers a policy reaction to reduce monopoly power that might interfere with the realization of benefits from trade. In the case of international trade, the first step might be trade laws that deal with competitive practices. A second step might be creating or restructuring regulatory frameworks to control monopoly power. A third step might be open access to subject as much of the monopoly’s assets to market forces as possible. Acting *against* these forces is the constraint of state ownership and/or control. The stronger the role of the state, with national monopoly protected by constitutional provisions being the most extreme form, the more difficult will be the entire process. Canada, the U.S. and Mexico are pursuing parallel pathways using the above model. The process in each jurisdiction (federal, state, provincial) is moving at varying speeds and with varying degrees of difficulty.

When our process models for marketization and trade flows are combined with the context of North American energy integration and the NAFTA, several broad issue categories are raised.

- **“Publicness” of the natural gas and electricity industries.** This concept embraces the nature of “public interest” in its historical usage (ownership and operation of public companies and

whether this is the same concept as “monopoly.” Importantly, within any commercial trade regime, “privatization” does not necessarily lead to free trade.

- **Timing of restructuring.** The nature of restructuring and length of transition are crucial to understanding the future shape of the North American marketplace. Importantly, publicness is related to energy restructuring (the problem of getting around state monopolies) and thus to timing.
- **Governance.** Across North America there is variability in the nationalism/federalism dimension. This differentiates the NAFTA partners and has huge implications for publicness and timing.
- **Economic development.** We must accept that there is also variability in the comparative economic development of the NAFTA partners. This dimension affects publicness, timing and governance.

These four broad issue categories form the basis for our thinking, our scenario analysis and our interpretations of the results from our scenario analysis. They are derived from our review of historical and current conditions (as reported in the Appendix) and our analysis of key legal, political and technology transfer considerations for North American energy development and trade.

## **NAFTA: The Legal Perspective**

North American energy relationships revolve around specific legal parameters that must be taken into account in any analysis of how the marketplace might evolve. We conducted an analysis of the particular legal changes that will affect North American energy integration. The analysis takes into consideration the complicated historical context of contractual negotiations and issues between the three countries. We also investigated the manner and extent to which NAFTA actually changes the legal arrangements between the nations, and the consequences of those changes. Because most of the energy-related trade issues have revolved around natural gas, that is the focus of our analysis. Issues with electricity trade, which is not inconsequential (see the Appendix for background on both fuel markets), are likely to grow and the organization for and conflicts around continental natural gas trade may serve as analogies.

### *Historical Transactions*

The U.S. and Mexico have traded modest quantities of natural gas for most of this century.<sup>7</sup> The gas has flowed in both directions across the border from time to time, depending on need and demand in each country. In most cases, government approvals for these low-volume transactions have been routinely granted with no difficulty. But there have been instances where government involvement has impeded the growth of these transactions.

Early exports from the U.S. were limited primarily to industrial and residential consumers in the northern regions of Mexico in and around Monterrey. Initially, the sales were accomplished through pipelines and distributing companies constructed, owned and operated in Mexico by U.S. firms.<sup>8</sup> Despite purchase or expropriation of the transmission function by Pemex in the 1950's,<sup>9</sup> the sales continued to expand slowly into the 1970's, when energy price escalations made the sales less attractive to Mexico.

Gas trade between these countries has not always been in one direction. In 1957, for example, Pemex executed a contract with Texas Eastern Transmission Corporation for the export of gas to the United States. Deliveries were expected to be 28 to 57 bcf per year but were subject to Mexican domestic needs.

After reaching a peak of 52 bcf in 1965, sales volumes dwindled until 1975 when the transaction was terminated.<sup>10</sup>

On at least two occasions, government intervention has delayed specific transactions and disrupted trading relations. One occurred during World War II, another at the height of the energy crisis. In the latter instance, the political repercussions would last longer than the sales themselves.

By 1942, growth in gas demand had strained the original pipeline to Monterrey to capacity. To secure additional supplies for the area, Reynosa Pipe Line Company proposed to export gas produced in Hidalgo County, Texas, by means of a pipeline designed to connect at the Mexican border with a private pipeline to be constructed by a consortium of fifteen industrial firms operating as Gas Industrial de Monterrey, S.A. By this time, the export provisions of the NGA had become effective and the American company was required to seek FPC authorization for the transaction.

The FPC initially denied the application<sup>11</sup> on the absence of evidence that the fuel would be used to produce materials that would support the war effort and suggested that the needed gas supplies be obtained within Mexico.<sup>12</sup> A year later, the FPC modified its order to permit Reynosa Pipe Line to export its gas, but limited the exports to 50 mmcf per day because it still found the sales inconsistent with U.S. public interest.<sup>13</sup> Public reaction in Mexico indicated dissatisfaction with both FPC policy and the pace of Pemex expansion and generated predictable demands for accelerated drilling by Pemex to avoid dependence on U.S. supplies.<sup>14</sup>

### ***The Border Gas Agreement***

Gas transactions were more severely impacted by government involvement in the Border Gas Agreement during the late 1970's. This time the need for imports was in the U.S. market. At that time, the United States was still trying to cope with the dis-equilibrium in its gas market caused by government control of prices. Curtailments had become a problem and threatened to increase as demand for the fuel continued to grow.<sup>15</sup> Mexico, on the other hand, was enjoying increasing reserves of not only oil but also natural gas.<sup>16</sup> By the end of 1976, Mexico was producing over two bcf of natural gas per day<sup>17</sup> and planned to increase its production to nearly three bcf per day by the end of 1979.

On August 3, 1977, Pemex and Border Gas, Inc., a consortium of six American pipeline companies,<sup>18</sup> executed a letter of intent proposing the initial sale of 50 mmcf/d, rising to 2,000 mmcf/d by 1979, at a price equivalent to that of distillate fuel oil delivered to New York Harbor, the price being subject to semi-annual renegotiation. Implementation of the contract would depend on the construction of a forty-eight inch, 735-mile pipeline with an eventual capacity of 2.7 bcf/d from the Reforma fields along the Bay of Campeche to Reynosa, opposite McAllen, Texas on the U.S. border.<sup>19</sup>

It would also depend on U.S. government approval of the import. While approval of final sales of the gas within the U.S. would require approval of FERC, initial authority was needed at the time from the Economic Regulatory Administration within the Department of Energy. As previously discussed, this initial decision would hinge on whether there was any evidence that the proposed sale would conflict with the public interest. The price of the gas was a primary concern. Given the price of distillate fuel oil at the time, the initial contract price was to be \$2.60 per mcf.<sup>20</sup> Not only was this well in excess of most gas price ceilings being considered for inclusion under the NGPA, it would also link natural gas prices to the value of crude oil, which the U.S. had been resisting in negotiations with Algeria for LNG.<sup>21</sup> Moreover, the price was greater than the \$2.16 being paid on Canadian contracts, raising fears that Canada might insist on reopening negotiations to obtain increased prices if the Mexican contract were

approved.<sup>22</sup> This would increase U.S. gas costs two years before the necessary pipelines could be completed and Mexican gas shipments started.<sup>23</sup>

In an attempt to avoid bureaucratic wrangling over the issues, officials of the Energy and State Departments met directly with Mexican officials. Problems began to develop when the U.S. Export-Import Bank, prompted by Congressional questions over the proposed price, delayed a decision on the extension of credit to Mexico for the construction of its pipeline.<sup>24</sup> Amidst Mexican charges of duplicity on the part of American officials,<sup>25</sup> discussions were broken off when the U.S. delegation rejected the price terms agreed upon by the parties.<sup>26</sup> The agreement was allowed to expire by its own terms at the end of 1977 and Mexico announced that the gas would be used domestically to free oil for export.<sup>27</sup>

After passage of the NGPA in 1978 eliminated complications and uncertainty over U.S. policy, government-to-government discussions were resumed in the spring of 1979. Although the pipeline was completed on March 18, 1979, the diversion of gas to other uses in Mexico meant that gas would not be available from the Reforma field but would have to be provided from the Reynosa field at a volume of only 300 mmcf/d.<sup>28</sup> Nevertheless, an agreement was reached by September that would assure authorization for the imports.<sup>29</sup> Actual and projected increases in world oil prices made it possible for the two countries to eventually compromise on an initial price of \$3.625 per million Btu, a figure between the price of distillate and residual fuel oil, set to escalate with a basket of five crude oils. The price could be reconsidered before January 1, 1980, if the price of "comparable sources" exceeded the agreed price, and quarterly thereafter using world oil prices as reference. The agreement could be terminated or the contract quantity reduced unilaterally by either party with 180 days' notice.<sup>30</sup> Pemex and Border Gas executed a Contract of Purchase and Sale on October 19, 1979, which reflected these terms.<sup>31</sup> Pursuant to the agreement between the two governments, the transaction received the requisite approval of the appropriate U.S. agency in December 1979.<sup>32</sup>

The transaction was again threatened when, on January 18, 1980, Canada raised its gas export price to \$4.47 per million Btu, effective February 17, 1980.<sup>33</sup> Mexico argued that its price should also be raised in the interest of competitiveness. By March, the ERA, under pressure from the DOE and the State Department had effectively approved parity pricing to Mexican and Canadian imports.<sup>34</sup>

Nevertheless, the transaction was short-lived. In the early 1980's, increased supplies and reduced demand for gas had caused the U.S. gas market to begin to collapse. In response, Border Gas reduced its offtake from 300 mcf/d to 180 mcf/d,<sup>35</sup> the minimum quantity allowed under the contract. In 1984, the U.S. consortium demanded a reduction in the contract price from \$4.40 to \$3.86 per mmBtu. Mexico refused and the contract was suspended on November 1, 1984.<sup>36</sup>

In retrospect, Mexico has viewed the entire transaction with disfavor. The construction of the pipeline, criticized by some as hastily conceived,<sup>37</sup> required longer than planned to repay much needed investment funds. Moreover, surrounding events necessitated politically embarrassing apologies that further slowed revisions in energy policy.<sup>38</sup> Assessments are that the negotiations were "hopelessly inept"<sup>39</sup> and represented the "worst of US diplomacy."<sup>40</sup>

NAFTA changed many of the laws that decide the criteria by which the licenses are issued. However, there was one primary exception, the energy industry. The Natural Gas Act (NGA) controls the import and exports of natural gas and electricity through licensing, a procedure with certain prescriptive elements about whether it is in the "public interest" to import or export for each contract. The following is an analysis of the criteria by which the license is judged to be compatible with the "public interest" in each of the three NAFTA countries.

## *Current Transaction Issues*

### *Export Issues*

While considerable attention has been given to these questions, few if any requests for export authorization have been denied on the basis of domestic need alone.<sup>41</sup> To a great extent, this can be attributed to the relatively small quantities of gas involved in most export transactions. It may also be due to the fact that gas production cycles in North America have been such that in times of shortage in the U.S., when the issue of domestic need is most pronounced, both Mexico and Canada have enjoyed gas surpluses and have had little interest in additional gas from the U.S.

Nevertheless, the U.S. government has been continually aware of the negative impact foreign gas sales can have on the public interest in the event of a severe domestic shortage. Our government has attempted to hedge against pronounced changes in the balance of supply and demand by conditioning export authorizations in a way that assures some continuing control over the transaction or places a limit on the volumes of gas that can be exported without further authorization. This is easily accomplished by conditioning the authorization to limit the duration<sup>42</sup> and volume<sup>43</sup> of gas exports to that specified in the approved contract with the foreign purchaser and precluding any modification of the contract without the prior approval of the agency administering the export license. A more stringent condition has required termination of the export sale if a situation develops in which the gas is needed in the U.S.<sup>44</sup> As exporters adjusted their sales agreements to these requirements, the Commission was able to eliminate both restrictions if the sales contract itself allowed for termination of sales when U.S. domestic demand dictated a curtailment of foreign service.<sup>45</sup>

The ERA recognized under the latest delegation order that domestic need is the primary consideration for export approval,<sup>46</sup> and announced a three-step analysis of the issue.<sup>47</sup> The first step examines whether regional or national demand<sup>48</sup> can be reasonably expected to exceed domestic supplies<sup>49</sup> anticipated to be available during the term of the export. This initial inquiry reflects two of the department's traditional concerns over the impact of the export on domestic need: whether the export will impair the applicant's ability to render adequate service to its existing customers and whether some unsatisfied market in the U.S. would be better served if the gas were retained in the domestic market.<sup>50</sup> Secondly, if a gas shortage is projected at the regional or domestic level, the DOE determines the extent to which it can be met by other energy resources. If alternative fuels can be effectively used, the third step in the analysis focuses on whether there is some reason the exported gas should be used to satisfy the need instead of an alternative fuel.

### *Import Issues*

As with exports, need has traditionally been an issue in evaluating import applications. As previously noted, unnecessary imports may displace domestic energy development and business activity.<sup>51</sup> However, the issue has been considered along with others affecting the public interest<sup>52</sup> and has rarely served as a singular test that precludes consideration of other factors. In actuality, the relative infrequency with which need and displacement of domestic fuels have been cited as justification for denying import authorization indicates that this issue has been employed only to halt clearly unnecessary imports.<sup>53</sup>

The traditional approach by the Commission in dealing with imports has been to emphasize regional need,<sup>54</sup> which is the need on a particular pipeline system that cannot be met by domestic supplies.<sup>55</sup> This is accomplished by comparing projected demand in the pipeline's market area<sup>56</sup> with estimates of domestic gas supplies available to the market for the term of the proposed import.<sup>57</sup>

In the absence of regional need, the U.S. has required that national need justify the import.<sup>58</sup> Even though the market area receiving the gas is sufficiently supplied, the import should free domestic gas used in that market for sale in regions where demand is not being met.<sup>59</sup>

The following table represents the legal criteria by which licenses are granted for imports and exports in the U.S., Canada, and Mexico. It includes the development of the laws and the new market-based criteria by which each country grants licenses.

**Table 2. Natural Gas Export/Import Criteria**

Issue	United States	Canada	Mexico
Licensing	<p>Section 3<sup>60</sup>, 7<sup>61</sup> of the NGA:            Contrary to section 7's requirement of an affirmative finding that the public interest will be served by the proposed service, section 3's provisions call for grant of the requested authority unless there is a negative finding that the public interest will be ill served by the export or import<sup>62</sup>. Three factors emerge as critical elements of the public interest in the review of import and export applications: price, security, and domestic need.<sup>63</sup></p>	<p>Originally, the NEB was required to consider four factors in reviewing a license application: (1) the availability of gas; (2) the existing and potential markets for that gas; (3) the opportunities for Canadian citizens to participate in the project; and (4) whether the project was in the public interest.<sup>64</sup> In contrast to the approach by the U.S., Canada has traditionally relied on detailed guidelines to explain its export policies. Currently, need is the sole factor required by the National Energy Board Act to be considered in the evaluation of export requests.<sup>65</sup> Price, despite playing a significant role in the 1970's and early 1980's, is now inconsequential to license approvals.<sup>66</sup></p>	<p>Because Pemex has had a monopoly on gas transmission within Mexico,<sup>67</sup> no gas imports and exports have been able to occur without its involvement. Since the government controls Pemex, it does not enter such a transaction without first considering the public policy issues involved in advance of contracting. Although Pemex was organized as a decentralized public institution, Pemex is far from independent.<sup>68</sup> Mexico's President<sup>69</sup> appoints the majority of Pemex's Board of Directors,<sup>70</sup> and its Director General.<sup>71</sup> The company's activities are closely monitored by several federal agencies<sup>72</sup> and it is bound to adhere to government policies that directly apply to energy operations<sup>73</sup> Trade decisions have been made through different procedures in which basic issues and reasoning are rarely, if ever, made public. Gas import and export decisions have had to make allowance for policies of political independence, resource conservation, energy self-sufficiency and the effects of central planning, taxation and subsidies on the Mexican petroleum industry.</p>

Issue	United States	Canada	Mexico
Price	<p>Because no free market for gas had existed, the FPC and FERC were forced to rely on a comparison of the contract price for the gas being sold with the price of alternative fuels that could be effectively substituted for natural gas by consumers with fuel-switching capability.<sup>74</sup> Distillate fuel oils became the standard measure of import pricing until the mid-1980s.<sup>75</sup></p>	<p>Beginning in 1967, the statutory requirement for a just and reasonable export price was defined by three NEB guidelines. (1) Prices must reflect their proportionate share of costs. (2) Prices must be no less than the domestic price charged in the area of delivery. (3) Prices must equal or exceed the price of the least cost alternative energy source in the U.S. market.<sup>76</sup> After finding in 1973 that export prices were underpriced in relation to alternate fuels in the U.S. market, the NEB recommended "commodity value" for gas exports based on the price of U.S. domestic gas and alternative fuels.<sup>77</sup> In 1977, the Canadian Board adopted a theory that set gas export prices at a level equal to the "substitution value" to the Canadian consumer, the average Btu-equivalent price of imported crude oil.<sup>78</sup> The federal government entered an agreement in 1985 known as the "Western Accord," which pledged action to implement a regime of market-sensitive pricing for domestic and export sales (refer to the Appendix).</p>	<p>The critical elements of the pricing issue for Mexico appear to be the same as those for the U.S. and Canada. At a minimum, the price of the export must not be so low as to grant a subsidy to the foreign consumer or to attract less than full value of the commodity in the existing market. The principal difference in Mexico's practice is the low level of gas imports and exports observed between extremes in the price cycle for natural gas. U.S. and Canadian authorities have encouraged sales whenever the price fairly reflected that set by market mechanisms. Mexico's lack of interest in maintaining a continuous international market for its gas production reflects, in part, some residual commitment to conservation of natural resources and a political concern for avoiding any degree of exploitation. It also carries the benefit of avoiding political allegations that the country is being exploited by delivering non-renewable resources at less than full value.</p>

Issue	United States	Canada	Mexico
Security	<p>Security of supply is a concern traditionally associated with imports, rather than exports. Reliance on a foreign source of gas exposes the importing nation to several potential harms if sales are discontinued. There are two potential risks<sup>79</sup>: sufficiency of reserves in the exporting country,<sup>80</sup> and the intentional interruption of the foreign supply.<sup>81</sup></p> <p>The factors previously noted to be relevant to the issue of security of supply are as historical reliability of the supplier,<sup>82</sup> adequacy of reserves and pipeline capacity,<sup>83</sup> contractual warranties<sup>84</sup> and international and foreign policy factors that support the transaction.<sup>85</sup> The courts have made it clear that, while the government may employ the import guidelines and their presumptions, it must still adequately respond to all issues raised in connection with whether the proposed import is not inconsistent with the public interest.<sup>86</sup></p>		<p>The significant capital investment demands that gas be available for a prolonged period until that investment can be recovered. Security is even more critical for a developing country where costs associated with gas use are even greater because of the need to convert many users to gas and where investment funds must be applied wisely. The gas sales from the U.S. to Mexico have never been of sufficient size and duration to provide a sense of security. The fear is that, following a widespread conversion to natural gas, and investment in the infrastructure needed to support an enlarged gas industry, the country would become susceptible to disruptions or threats of disruption over matters where Mexico's national self-interest conflicts with those of the supplying country. Termination of export transactions can deprive the exporting nation of much needed and expected foreign revenues. Concern over this factor should not be unexpected in Mexico, where memories are still fresh of the devastating effect the reduction in income from oil exports had on the economy during the decline in world oil prices in the early 1980's.</p>

Issue	United States	Canada	Mexico
Need	<p>Imports raise the issue of whether foreign gas will displace, or discourage investment in, domestic energy firms by competing unnecessarily with domestic supplies of gas. If imports are encouraged to the extent that the domestic industry is diminished, the security of domestic supplies and, ultimately, rising import prices resulting from domestic shortages threaten to become problems. However, shortages can be so critical that need overrides issues of both price and security and becomes the principal determinant in import applications.</p> <p>Under the new import guidelines, need is intrinsically related to marketability of the gas. If the issue of domestic fuel displacement had a weak reception under the traditional factors considered by the FPC, it was almost eliminated by the emphasis on competition in these new guidelines.<sup>87</sup></p>	<p>To protect national domestic requirements, the NEB is permitted to authorize exports only when it is established that there is an exportable surplus above projected national demand.<sup>88</sup> If the volume of acceptable export requests exceed this surplus, the NEB may allocate the surplus among the applicants based on the comparative costs and benefits of each transaction, pipeline capacity and the attractiveness of the destination market relative to others.<sup>89</sup> The Reserves Formula reduced the measure of demand that was compared to reserves by combining domestic demand with export volumes actually authorized by the NEB, rather than volumes required in the underlying contracts. Still, probable reserves were not included in the calculation until they were economical and the NEB was convinced that transportation facilities would be constructed to remove the production.<sup>90</sup> The Deliverability Appraisal, was designed to guard against exports absorbing deliverability needed to meet domestic demand, and was primarily intended to provide the NEB with greater flexibility in determining the deliverability profile.</p>	<p>As long as Mexico believes there is no need for foreign gas supplies, import volumes will remain low and there will be little reason to reconsider the weight of price and security issues. Likewise, as long as Mexico's gas production is reserved for domestic consumption, an examination of price and security issues associated with exports is unnecessary. The determination of the country's fuel mix, as established by its national energy plans and the investment decisions of Pemex, has dictated what fuels are available to consumers regardless of consumer preference. In the past, the concept of conservation kept all petroleum production at a level sufficient to the needs of the domestic economy. The supply necessary for exports was purposefully kept small. Even though exports are now encouraged, total production has been intentionally limited to that needed for domestic use plus a surplus for exports that will generate no more foreign revenues than the economy can effectively absorb. Due to the low gas/oil ratio for production, natural gas has not been plentiful enough to play a large role in the nation's energy plans. Plans for energy self-sufficiency during the 1980's only reinforced this situation. These plans called for primary reliance on coal, nuclear energy, and refined petroleum, including residual fuel oil obtained from Mexico's less marketable Mayan crude. In this setting, there has been little justification for constructing elaborate pipeline and distribution facilities for gas.</p>

Issue	United States	Canada	Mexico
Environment		<p>Canada's Environmental Assessment and Review Process Guidelines Order<sup>91</sup> requires federal agencies prepare an Initial Environmental Evaluation before authorizing a project that must determine whether the proposal will produce significant adverse environmental effects and whether such effects can be mitigated with existing technology. If such effects are expected and cannot be mitigated, the proposal must be submitted to the Minister of Energy, Mines and Resources for review. This review relates not only to the construction and operation of transmission facilities but also to the effects of end use. Moreover, the NEB has indicated that it will consider environmental impacts in both Canada and the importing country, adding an extraterritorial aspect to the Order.<sup>92</sup></p>	
Formation of Market Based Procedures	<p>The DOE revised its guidelines for gas import authorizations alone.<sup>93</sup> Three criteria were listed that were substantially similar to previous considerations:<sup>94</sup> (1) competitiveness; (2) need; and (3) security of supply. Allowing supplements to the nation's gas supply on a competitive, market-responsive basis while avoiding undue dependence on unreliable foreign sources was the purpose. Thus, competition was seen as not only compatible with the public interest, but necessary.<sup>95</sup> To avoid costly and time-consuming evaluations of the substance of each transaction, officials were permitted to rely on the market and freely negotiated contracts to the extent possible, based on certain presumptions.<sup>96</sup></p>	<p>The elimination of a gas shortage and the erosion of the U.S. gas market resulted in declining exports of gas from Canada to the U.S. in the early 1980's. This prompted the Canadian government to begin to re-examine its export requirements. Price, despite playing a significant role in the 1970's and early 1980's, is now irrelevant to license approvals. As a result, need became the primary factor required by the NEB Act to be considered in the evaluation of export requests.<sup>97</sup></p>	

Issue	United States	Canada	Mexico
Price and Competitive-ness	As long as flexibility of price or volume allows the U.S. importer to respond adequately to changing conditions in the market, the transaction is presumed to be competitive. <sup>98</sup>	<p>In 1983, the NEB had reduced its export price for the first time and implemented a Volume Related Incentive Pricing scheme designed to encourage the purchase of Canadian gas by lowering the minimum export price for sales in excess of annual "base volumes." <sup>99</sup> Now, under the Western Accord, the NEB announced that it would no longer require strict adherence to minimum border prices. <sup>100</sup> Initially, there were seven criteria that the exporter was required to meet:</p> <ol style="list-style-type: none"> <li>(1) The price of exported gas had to recover its appropriate share of costs incurred.</li> <li>(2) The price could not be less than the wholesale price of gas at the Toronto city gate and had to be sold under similar terms and conditions.</li> <li>(3) The price had to equal or exceed the price of major competing energy sources in the U.S. market area.</li> <li>(4) The export contract was required to contain provisions that permit adjustments that would reflect changing market conditions over the life of the contract.</li> <li>(5) The export arrangement had to provide reasonable assurance that the volumes contracted would be taken.</li> <li>(6) Producers supplying the gas had to have endorsed the terms of the export arrangement and any subsequent revisions.</li> <li>(7) It had to be demonstrated that the economic return to Canada would be enhanced if the contract were renegotiated.</li> </ol>	

Issue	United States	Canada	Mexico
Price and Competitive-ness, cont.		<p>However, this list was soon modified. An October 1985 agreement<sup>101</sup> between the federal government and the producing provinces over gas markets and prices, eliminated item (3) that continued to require equivalence to substitute prices and item (7) requiring enhancement of the Canadian position in the event of any renegotiation. Additionally, item (2) was amended to remove reference to the Toronto city gate price and to return to the a minimum price equal to similar service in the area adjacent to the export point and modified again, to provide for a system for monitoring the prices of actual transactions.</p>	
Short term sales	<p>The U.S. government has recently shown a clear preference for short-term sales. Consistent with its market-based approach, spot sales are seen as placing downward pressure on prices and encouraging renegotiation of previous arrangements that have become uncompetitive.<sup>102</sup> By their nature, these sales are short-term, interruptible and voluntarily negotiated, enhancing competitive pressure<sup>103</sup> and providing assurance that they will be consistent with the public interest as defined in the new guidelines.<sup>104</sup></p>		

### *A Note on Electricity*

As stated in the opening to our legal analysis, natural gas trade has traditionally been more significant than for electricity in North America, thus our view of natural gas trade as a possible analogy for electricity. That said, there are several aspects of cross-jurisdictional electricity trade that should be mentioned.

- Export/import licensing for electricity follows a path similar to that for natural gas with the NEB, the DOE's Office of Fossil Energy and CRE holding the key positions of responsibility in making determinations (refer to the previous table and associated endnotes).
- With expanded cross-jurisdictional trade, the following areas are likely to become points of legal, as well as political, conflict.
  - Need, pricing, security and transmission tariffs.
  - Reliability and reserve margins (the amount of generation capacity utilities in the U.S. and Canada are required by regulators to build into their systems in order to meet peak period demand).
  - Within Canada and the U.S., electricity restructuring and tensions between federal and provincial/state jurisdictions as well as among established utilities and new entrants.
  - The overall regulatory environment for electricity and variations across Canada and the U.S.
  - Willingness on the part of Mexico's CFE to experiment with electricity wheeling from import points in order to solve system deficiencies, as well as progress in independent power development in Mexico or a fundamental restructuring of Mexico's electricity sector.
- Importantly, technological requirements for expanded cross-jurisdictional trade must be resolved for this to become a reality, in particular along the U.S.-Mexico border.

### *NAFTA Energy Provisions*

On January 1, 1994, general trade among Canada, the United States, and Mexico was altered dramatically with the implementation of the North American Free Trade Agreement.<sup>105</sup> NAFTA was intended, in part, to eliminate barriers to trade and facilitate the international movement of goods and services among the three countries. Although this meant freer trade for many goods and services, energy products such as natural gas and electric power were subjected to restrictions that severely limit the benefits of Agreement.

Four facets of NAFTA are particularly important to future trade in natural gas and electrical power: restrictions on tariff and non-tariff barriers; national treatment requirements (reciprocity); crisis exceptions; and anti-trust constraints.

#### *Tariff and Non-Tariff Barriers*

Tariffs and export taxes are one of the common trade barriers that can impede international commerce. Traditionally, these have not presented a major problem for energy transactions within North America.<sup>106</sup> Nevertheless, the threat of increased duties, or the mere presence of existing duties as international competition expands, can prevent any commodity from reaching its full potential in international commerce.

As a result, NAFTA requires the phased elimination of all remaining tariffs on imported goods and services, including energy products. These reductions are made at different rates for four general

categories of goods, so that most tariffs on North American goods are eliminated by 2003 and all tariffs by 2008.<sup>107</sup> Tariffs on natural gas must be fully eliminated by 2003, 10 years after the implementation of the Agreement.

Another levy that can impede trade is the export duty or tax. Under NAFTA, export taxes have been prohibited immediately for almost all goods and services.<sup>108</sup> As to energy products, export duties and taxes are prohibited except to the extent they are applied against the same goods when destined for domestic consumption and equally applied against all parties to the Agreement.<sup>109</sup> Thus, taxes levied by the producing state on all domestic production can be applied to natural gas and electrical power that is destined for export without violating the general prohibition on export duties.

NAFTA deals with trade quotas and other restraints by incorporating the rules and exceptions on the subject in Article XI of GATT.<sup>110</sup> As a consequence, Mexico is free to retain historical trade quotas, and Canada and the U.S. may invoke similar restrictions against Mexico. This would likely be accomplished through export and import licenses, which the parties may continue to administer as long as they are consistent with NAFTA.<sup>111</sup> The use of licenses in this manner is further strengthened by Mexico's express reservation of the right to restrict import and export licenses for petroleum products, including natural gas, for the sole purpose of reserving foreign trade to the state.<sup>112</sup>

It is important to note, however, that NAFTA expressly prohibits import and export price controls for energy goods.<sup>113</sup>

### *National Treatment*

One important set of NAFTA provisions that applies to the energy industry as well as other economic sectors pertains to the requirement for national treatment. These provisions commit each of the three North American federations, and their constituent states or provinces, to apply the same legal rules to both domestic and foreign goods originating in the NAFTA countries.<sup>114</sup> Thus, all gas and electrical power will be subject to the same taxes, sales requirements, and usage regulations, regardless of whether the energy source was imported or produced domestically. Once admitted to a country, foreign energy products cannot be discriminated against within any domestic market.<sup>115</sup>

### *Crisis Exceptions*

NAFTA recognizes that crisis conditions may require any country to take steps to protect its domestic energy market to the extent allowed under GATT.<sup>116</sup> This would allow a country to impose temporary restrictions in certain situations, such as conservation of exhaustible natural resources, control of critical supply shortages, or price stabilization plans.<sup>117</sup> However, the Agreement limits protective action that affects energy trade with a North American partner in three ways:

(1) Exports cannot be reduced below an amount that maintains the proportion of national reserves to exports prevailing during the last 36-month period.<sup>118</sup> This assures that importers will be treated no differently than domestic purchasers by preserving established trading patterns that are not the result of unexpected market disruptions. Nevertheless, if national energy supplies decline, the shortage is shared by both domestic and foreign purchasers.

(2) Additionally, no state may use devices such as licenses and minimum price requirements to impose a greater price on exported energy products than on those consumed domestically.<sup>119</sup> Price

increases caused by supply shortages or efforts to reduce demand can occur but must be applied equally to the domestic and export markets.

(3) Moreover, crisis restrictions must not disrupt normal channels of supply to another NAFTA party nor result in changes to the proportions among specific energy products being supplied.<sup>120</sup>

These proscriptions are derived from CFTA<sup>121</sup> and, hence were applicable to trade between Canada and Mexico before NAFTA. Unfortunately, however, NAFTA only continues the proscriptions as the applied under CFTA and does not extend them to apply to energy trade involving Mexico.<sup>122</sup>

### *Anti-Trust Restraints*

NAFTA recognizes that certain energy-related activities, including gas pipeline transmission and electric power supplied as a public service, are strategic activities in Mexico that are subject to state ownership and regulation.<sup>123</sup> Moreover, each party retains the right to authorize and maintain monopoly activities, including state enterprises,<sup>124</sup> such as Pemex, CFE and Hydro-Quebec.

To enhance the free trade objectives of the Agreement, each party is committed to take appropriate action to proscribe anti-competitive business conduct.<sup>125</sup> More specifically, each country is required to use regulation and supervision to assure that both private and state-owned monopolies act solely in accordance with commercial considerations<sup>126</sup> and avoid discriminatory treatment<sup>127</sup> in the purchase and sale of any monopoly good or service.

Although natural gas suppliers are permitted to negotiate contracts directly with Mexican end-users, the contracts are subject to participation by state enterprises, such as Pemex.<sup>128</sup>

### *Implementation of NAFTA*

Despite its intent to assure free trade, NAFTA was unable to fully accomplish this goal in the energy sector. Both historical and political considerations in Mexico weighed heavily against opening the energy industry to foreign investment and competition. As a result, the virtual transparency of energy trade between the U.S. and Canada that was achieved through recent regulatory revisions and the CFTA were institutionalized in NAFTA. But reservations and restrictions necessary to obtain Mexico's approval of the Agreement leave future energy trade with that country in doubt.

For the U.S. and Canada, NAFTA prohibitions on price and volume restrictions completed the elimination of these key historical factors in import/export decisions. Through legislation and recent market-based regulation, both the U.S. and Canada had greatly reduced the significance of price and supply in licensing procedures. What remained of security concerns under U.S. guidelines and domestic supply issues in Canada's Market-Based Procedures were eliminated by the open trade requirements imposed first by CFTA and then NAFTA. The automatic approval of import and export licenses that were being used for short-term natural gas transactions by the U.S. and Canada received expanded application under these free trade regimes.

In response to the implementation of NAFTA, the U.S. enacted the Energy Policy Act of 1992 to assure U.S. compliance. Among other things, the Act amended the NGA Section 3 provisions on gas imports and exports. Gas transactions with countries having a free trade agreement with the U.S. were declared, as a matter of law, to be consistent with the public interest and export and import licenses must be issued

without modification or delay.<sup>129</sup> By similar action, Canada amended its statutes to require the NEB to give effect to NAFTA's provisions. Canada's federal government is granted the right to intervene in NEB proceedings and issue orders compelling the NEB to reach decisions consistent with NAFTA. Changes in this domestic legislation in the U.S. and Canada are limited to the gradual adjustments permitted only in crisis situations in under NAFTA.

The direction and effect of energy trade with Mexico remains less certain and is dependent on the way in which that country elects to exercise its reserved rights under NAFTA. Mexico has the power to open its borders to the free flow of energy products, to protect its domestic industry from outside participation and competition, or to find some middle ground that admits trade on a selective basis.

This power is derived from two NAFTA reservations in particular. First, Mexico's right to refuse export and import licenses to protect state trade, including the ability to apply volumetric quotas to energy exports and imports. Second, Mexico's right to maintain its state-owned monopolies in the petroleum and electric power industries. Much depends on the degree to which Mexico elects to use the first and the extent to which it honors its commitment to prevent the latter from being exercised in non-competitive ways.

In the latter instance, encouraging developments have followed the implementation of NAFTA. In 1995, Mexico enacted new laws permitting foreign ownership of gas transmission facilities and establishing a regulatory structure for assuring open access at fair rates to all pipelines in the country.<sup>130</sup> The Energy Regulatory Commission (CRE) established by this legislation has promulgated regulations to implement this regulatory scheme. While it remains to be seen how effective the CRE is in controlling the monopoly position held by Pemex and at authorizing foreign investment in new gas pipelines, some initial progress has been made.

With respect to the former concern over the government's control of energy imports and exports, foreign companies continue to wait for firm guidelines on how Mexico will regulate the flow of energy across its borders.

The CRE's gas regulations clearly envision that the "import and export of gas may be freely carried out," but recognize that this must be done pursuant to the licensing requirements of the Law of Foreign Commerce.<sup>131</sup>

In 1992, Mexico enacted legislation that permits imports of electrical power by private entities for their own use<sup>132</sup> and exports of power by cogenerators, independent producers and small producers.<sup>133</sup> Still import permits must establish the terms and conditions under which the transactions will be allowed.<sup>134</sup> Parties exporting electric power must submit their sales contract to the Ministry of Energy, Mines and Parastatal Industry for recording<sup>135</sup> and cannot redirect the power to a user in Mexico without the consent of CFE.<sup>136</sup>

Until the requirements and procedures for obtaining import and export licenses for natural gas and electric power are clearly stated by the government, the degree to which Mexico intends to promote free trade in these products will be unknown. Moreover, with no restrictions compelling free trade in energy, Mexico will always have the ability to modify its trade policies. As long as energy remains a politically sensitive issue in that country, long range perspectives will be difficult.

To the extent that Mexico's trade policy is dictated by the same concerns over need and security that has affected U.S. and Canadian policy in the past, something short of free trade in energy must be expected.

Unless, and until, Mexico's policy evolves like that of its northern trade partners, the country will likely seek to control the flow of gas and electric power over its borders.

### ***Summary and Conclusions – Key Factors and Trends***

Several conclusions can be drawn from our analysis of legal considerations.

- Energy trade among the major North American countries has had a turbulent history. Government controls of export and import licenses in particular resulted in uncertain or complex regulations that regularly imposed delays and administrative costs and sometimes prevented culmination of the transaction. In some cases the latter was the result of government decisions. In others government ineptitude or political maneuvering caused it.
- As a primary industry, energy transactions will always invoke issues of public policy. The public interest is particularly affected with imports and exports, which have repeatedly raised issues related to price, need and security.
- Over time, through regulatory changes, statutory enactments, and international agreements, the U.S. and Canada have established complementary systems of trade regulation affecting natural gas. The stage has been set for nearly transparent trade activity that promises to allow an efficient distribution of energy resources between the two countries.
- Despite hopes that Mexico could be included in this energy market, potential barriers remain even under NAFTA. This results from the reservations and restrictions insisted upon by Mexico itself. While both the U.S. and Canada stand ready to include Mexico in an integrated energy market, Mexico has elected to take a more cautious approach. This hesitation was to be expected, given the historical and political significance of the energy industry in that country.
- As a result of Mexico's NAFTA rights, the eventual direction of energy trade with that country remains in its own control. While Canadian and American companies may be ready and anxious to enter the Mexico's market, the ultimate decision will rest with the Mexican government. The outcome awaits major political and economic decisions affecting the country's energy market and its state-owned monopolies.

### **Politics in the NAFTA Region**

Our study deals with risks and uncertainties derived from the socio-political context in an effort to understand the time frame for North American energy market evolution. This focus emphasizes the stakes of major players, such as the federal governments, states or provinces, and other political and interest groups, that have an effect on policy making within the three countries and therefore can affect the process of integration. Another important concern for our analysis of political integration among the NAFTA countries is regional autonomy within nations. If we envision North America as a system of *interconnected regional markets*, then the bottom-line question becomes how well these interconnected markets function together and the central problem is the variability among sub-federal jurisdictions, regional policy and regulatory norms.

A particularly vexing question is will NAFTA aid the process of opening the Mexican energy industries? Clearly, many of the factors that underlie energy sector reform in Mexico are economic, which renders them more predictable, and many stem from the same drivers that led to the NAFTA. Just as clearly, many of the factors that work to encourage or inhibit energy reform are political and have to do with the interests of the stakeholders and power-brokers, subjects that are much less susceptible to an economic forecast. We remind the reader, however, that certain characteristics

about Canada remain poorly understood and, when it comes to the political dimension, U.S. energy certainly is not excluded.

### *Theoretical Overview*

Political considerations concerning energy (or, for that matter, any other field) combine virtually limitless institutional and personal variables. For example, microeconomics begins with a set of limiting axioms about human behavior that basically assume that individuals will always maximize benefits and reduce costs to the extent possible. These assumptions sharply reduce the number of plausible predictions. Rational behavior is a necessary assumption in microeconomics. However, history is replete with examples that contradict the heuristic utility of such assumptions in politics. Clearly, neither individuals nor collective societies have always maximized their utility in a rational manner with every political decision. This is not to suggest that rationality plays no role in political behavior, because, of course, it does. But ideology and the personalities of political actors, among other variables, sharply limit the application of strictly economic models in making political considerations. The net effect is that one must be far less confident in making political predictions than one would in making a judgment about business behavior.

This observation leads to the next consideration that makes our task a little easier in some contexts. Some nations are bound by institutional frameworks that limit the degree of arbitrariness that may be manifested. One may, for example, vehemently dislike a United States Supreme Court decision on the outcome of an election. Nevertheless, the deeply ingrained legitimacy of our institutional frameworks compels virtually all United States' citizens to accept the results. In this respect, it is evident that the legitimacy of such institutions are more deeply ingrained in the United States and Canada than they are in Mexico. Corruption has been widespread in Mexico's political arena and political rules have traditionally favored the PRI – Mexico's long-time ruling and largest party – and its allies.

Clearly, things are changing for the better in Mexico, but they are still a far cry from the fairness and legitimacy that characterize United States and Canadian political institutions and processes. For example, on November 18, 1996 the *Wall Street Journal* reported the following.

“Zedillo acquiesced to a rebellion by ruling party legislators against his initiatives to further democratize Mexico's political system... President Zedillo's decision...was seen by analysts as a setback for Mexico's political modernization.”

Thus, in predicting what might take place with respect to Mexican institutions in response to the NAFTA, we must consider that the lack of political capital to engender public compliance with unpopular decisions. Therefore, Mexico is relatively constrained in the kinds of decisions that can be made – which is then what makes the behavior of the Mexican government so difficult to predict using the axiom of rationality.

International agreements such as NAFTA present a different set of institutional issues. Again, Canada and the United States, once having entered into international agreements, tend to treat them in much the same manner that they treat national laws. Indeed, the U.S. Constitution requires treaties to supersede national or state laws with which they conflict. Nevertheless, it would be naïve to believe that perceived national self-interest plays no role in relations between the two nations. Disputes over plywood and a host of other commodities have arisen between the world's two largest trading partners, but they are ordinarily resolved in institutions created for this purpose. Mexico has a record of abiding by international agreements, as well.

But there is another factor at work in the Mexican case that reinforces Mexico's obligations – its considerably weaker economy. As the fall 1996 resolution of the Mexico-U.S. tomato crisis illustrated, the 1995 peso crisis and subsequent U.S. bailout provided Americans with considerable leverage over Mexican decision making. The U.S., of course, must be willing to exercise this leverage, as it was in the tomato dispute. This has not been the case with respect to Mexico's backtracking on petrochemicals privatization and its related October 1996 policy restricting foreign ownership to minority interests in state-owned facilities.

The foregoing considerations lead to the following conclusion: Political action is both shaped and constrained by institutional variables, though the degree of constraint varies in strength. For example, a regulatory authority may make binding – indeed, unpopular – decisions (the United States Federal Reserve System is one example) or it may simply be advisory. Again, the U.S. executive is far more constrained than the Canadian Prime Minister because of the legislative branch's far greater independence. Further, as we discussed with Mexico, the institutions have even less impact on political action because of the lack of legitimacy.

Given the theoretical setting for North American political relationships described above, we turn to the various political risks and uncertainties that can affect our, or any other, conceptualization of North American energy integration.

### ***The North American Political Context***

#### ***Political Groupings***

One factor driving political risk and uncertainty in North America is the comparative strength of political groupings and their ability to impose costs on those with decision-making authority. Political groupings are not interest groups, such as labor unions, business associations or political entrepreneurs. Rather, political groupings are directly involved in the processes designed to control the machinery of government. Political parties are the most obvious form of political groupings. But revolutionary movements, such as those in Chiapas, are also included. Similarly, political groups that seek to separate from other parts of a nation and control government in a region or province, such as the Parti Quebecois (PQ) in Quebec, are also included. Less noticed in the non-Canadian press but of considerable importance in Canada are the various organizations of native peoples, some of whom seek to assert authority over vast areas of the North, many of which contain rich energy resources. Generally, these groups view the economic development of the regions over which they assert authority with considerable suspicion, if not overt hostility.

What are the implications of the authority asserted by political groupings, including sub-national authorities? In order to answer the question we introduce the concepts of transaction costs, the costs incurred in reaching and enforcing an agreement, and information costs, the costs incurred in obtaining information about the prospective use of resources. Clearly, any regime instability, including the possibility of secession or revolutionary activity, increases both transaction and information costs compared to their levels absent these factors. Similarly, the need to negotiate with or closely follow the activities of sub-national governments also increases such costs. Accordingly, controlling for other variables, higher transaction and information costs tend to act as disincentives to foreign trade and investment. To be clear, prospective benefits may still outweigh prospective costs, but aggregate costs will obviously be higher in the case of higher transaction and information costs. To the extent that Mexico has unitary government, its transaction and information costs may be lower than those countries like Canada and the U.S. with federalist systems in which authority is divided between national and sub-national governments, other things being equal. To the extent that central governments in federalist systems can speak with unquestioned authority, or to the extent that federal

and sub-national policy actions are harmonious, transaction and information costs in those countries may be reduced. Thus, the concepts of transaction costs and information costs cut several ways in assessing how political groupings affect the opportunities and risks associated with foreign trade and investment.

The internal cohesion of political parties can have a major impact on outcomes. Consider only the extraordinary difficulty that President Clinton had with his own political party in accepting the NAFTA. On the other hand, Prime Minister Chrétien was able to easily move the Liberals at the national level to accepting not only NAFTA but using NAFTA as a model for free trade agreements with Chile and Israel. Although there are outliers, political parties in Canada at the national level are far more cohesive than their American counterparts. This essentially shifts the focus of political analysis to the elite level. The PRI, although it has dominated Mexican politics for almost seventy years, is a fragmented structure in which the leadership must coax and cajole the various factions but can be overruled, as well. This again shifts the political focus, from the elite level to the factional level. Factional politics helps to explain President Zedillo's backtracking on such issues as political reform and petrochemical privatization.

### *Interest Groups*

Another important consideration is the major role that interest groups play in shaping public policy, especially in a nation's dealings with a foreign country or its nationals. This much is obvious. But the way in which interest groups succeed or fail in the political arena is less obvious. Resources, such as substantial funds that can be deployed or a large membership of resolute followers, are certainly important. But the American political scene, in which relatively small organizations with substantial resources can have impact, illustrates that other factors can be even more important. Put simply, the most important resource that an interest group can manifest is its power to persuade the uncommitted that its particular interest represents the larger public interest. If an interest group succeeds in persuading large numbers of the public that its interest is equivalent to the public interest, it will exercise an influence far greater than the number of its members or its financial resources will. It will prevail over groups with which it is competing that have far greater financial resources and memberships. An interest group that follows the strategy outlined will attempt to show that its specific interests coincide with a nation's most cherished ideals and values. Similarly, such a group will effectively appeal to the deepest fears of large numbers of people by arguing that unless its proposed policies are followed, the worst will happen.

Environmental, labor, civil rights and isolationist groups in Canada and the United States were particularly vocal in their opposition to the adoption of NAFTA and were successful in influencing the final agreement. While the efforts of NAFTA's opponents to defeat the legislation in total failed, it is a mistake to think that the battles are necessarily over, especially with respect to cross-border energy trade and investment. Agreements can be rendered less effective in the implementation stage. Therefore, it is important to appreciate the impact of interest groups arrayed against NAFTA opponents, mainly business groups and middle class proponents of free trade. The outcome of these interactions was essentially acceptance of free trade with appropriate environmental safeguards with the goal of providing a higher level of benefits than costs. The challenge remains to design policies that lower the costs of achieving environmental goals, which might be accomplished by using techniques other than design standards, such as those embracing market-based and property rights solutions, loans and tax credits.

In the case of Mexico, the increased wealth that will presumably flow from the implementation of NAFTA and free trade generally will lead the Mexican public to increasingly demand environmental

improvements. Already, in March 1996 the Mexican government, attentive to the pressures of a burgeoning indigenous environmental movement, announced a five-year plan committed to the development of rules that would be more market- and incentive-based than in the past. Similarly, the Mexico City government announced new principles designed to improve the city's air, especially with respect to fuels including the creation of "pollution exchanges" in which dirtier companies could purchase pollution rights their cleaner counterparts similar to the U.S. trading program for sulfur dioxide (SO<sup>2</sup>).

### *Systems of Government*

A most striking difference across North America already referred to in our report is the three systems of government. The U.S. and Canada maintain decentralized, federalist systems of government that accord power to states and provinces. In the U.S., the constitution provides the strongest protection for state interests while in Canada the parliamentary form of government, which allows segmented regional and/or provincial interests to be expressed, is arguably the source of support. In both the U.S. and Canada, state and provincial interests have long dominated energy. The producer state-consumer state dimension in the U.S. has had substantial impacts on energy policy and regulation, markedly so for natural gas and electricity. In Canada, the most visible dimensions are the east-west, "Alberta-Ontario" axis along with Quebec's status as a low-cost producer of hydroelectricity combined with separatist inclinations. These dimensions rise and fall in importance depending upon the nature and scope of policy, market and trade issues. Mexico contrasts with its strongly centralized form of government, marked now by regional unrest that stems from regional differences without the commensurate authority and power.

While the U.S. is not threatened with revolutionary (as in Mexico) or secessionist (as in Canada) movements, it has always faced assertions of regional authority, albeit in far less dramatic fashion. The states and the federal government are not infrequently at odds over the reach of federal authority. (Nor are conflicts among states or provinces rare. Ontario and Quebec have long quibbled with Alberta over interprovincial energy transactions and prices. Commercial logic often overwhelms regulatory institutions. For instance, Nevada is captured by both California energy suppliers and that state's regulatory institutions because of Nevada's dependence on gas and electricity from California.) State regulatory agencies will assert policies within their jurisdictions that may be inconsistent with the thrust of federal policy. In recent times the United States Supreme Court has restrained the assertion of federal authority under the Commerce Clause of the U.S. Constitution. Some statutes, such as those dealing with environmental matters, have granted states the authority to impose more stringent standards than federal ones. In both Canada and the U.S., while the federal level asserts complete control over interprovincial, interstate and international natural gas and electricity transactions, the provincial and state governments dominate policy making with respect to transactions within their borders. In Canada, this extends to ownership control over electricity generation and distribution. Lastly, in both countries, state and provincial governments and regulatory commissions are increasingly involved in international trade matters. Mexico's system contrasts directly and sharply with its neighbors. In Mexico, states can assert few initiatives over their local markets. Thus, the national government is able to implement a piecemeal process to gradually open domestic markets to trade and investment following national prerogatives.

This piecemeal process extends to natural gas and electricity, where activity is progressing geographically, project by project, franchise by franchise. From the perspective of both Mexico's central government as well as that of prospective investors, this strategy *may* reduce costs. From the vantagepoint of local jurisdictions, this strategy is one more point of agitation. Taking the central government's position first, there are always many unknown factors and risks from the perspectives

of both parties to a transaction. Reducing the scope of the transaction from an entire nation to a small part of it certainly reduces information and transaction costs in ascertaining relevant factors. It also allows the parties to gather information about present unknowables as the performance of the agreement unfolds. In this way these costs are reduced as natural gas sector reform proceeds. By contrast, the government was compelled to reverse itself on its sweeping plan to privatize the state-owned national petrochemical industry controlled by Pemex. Looming on the horizon, though, is the potential for assertion of local authority over the decisions on which projects are selected, energy costs and prices, contracts for services and perhaps, ultimately, regulatory oversight. Local determination in Mexico is not restricted to energy, nor is it an isolated event. Rather, “devolution” from Mexico’s centralized system of government is likely to be a tumultuous companion to economic and democratic reforms. Eruptions are likely to center around land and land use (including claims of environmental damage caused by Mexico’s national energy monopolies), water and water rights and fuel and non-fuel minerals as well as flagrant political and criminal violence.

Aside from the broad organization of government in North America is the issue of compatible legal practices. The overall legal framework within a country dictates, to a large extent, the nature of institutional arrangements for energy. Here, the differences across North America are striking.

The legal systems in the U.S. and Canada are integral to the rise and conduct of independent regulatory bodies or tribunals. In both countries, the judiciary as a source of law distinguishes our systems from civil or Roman law which is the tradition in Mexico and elsewhere in Latin America. The power of the courts extends from our common law tradition which facilitates several sources of law in a loose hierarchy (constitution, legislature, executive branch and judiciary). Indeed, the very evolution of regulation in the U.S., where it has been in place longest, stems from judicial interpretation of due process. The 14th Amendment of the Constitution allows actors in the U.S. to intervene or seek redress: “No State shall...deprive any person of life, liberty, or property without due process of law.” Historically, the 14th Amendment limited government control over private entities. An important Supreme Court decision<sup>137</sup> interpreted certain economic activities to be in the “public interest” such that they can be excluded from the due process provision, opening the door to regulation. The lack of judicial restraint (meaning that regulation has come to be very broadly applied to industries that would not be considered public utilities), the application of due process as recourse, the degree to which regulation conflicts with the Bill of Rights, the extent of regulatory power as determined by the judiciary (such as the authority to regulate only price as opposed to monopoly power, entry and/or exit) and belief in the efficacy of competitive markets have all been sources of political conflict at one time or another in the U.S.

With establishment of regulation, the reliance on cost of service ratemaking and the legal/institutional history of regulation in the U.S. led to the evolution of specialized administrative law procedures based on the submission of evidence and legal determination as part of the fundamental regulatory process. Additional laws provide for open hearings by regulatory agencies (also called administrative agencies), allow them to make procurements or to let contracts and so on. Finally, certain courts have come to have particular experience in hearing litigation on regulatory issues, such as the Washington, D.C. Circuit Court of Appeals. Litigants against the Federal Energy Regulatory Commission, for example, often try to have cases assigned to other courts in order to avoid judicial support for the FERC.

It is not clear that, in Mexico, the civil law tradition will support independent regulatory functions in a manner to which U.S. and Canadian energy firms are accustomed. While many would argue that regulatory oversight, especially in the U.S., has gone overboard, private firms and individuals have considerable access to the process. Numerous protections for individual and private property rights exist. The due process tradition allows private actors recourse against regulatory decisions. The

specialized courts provide for a more efficient process than might exist otherwise. The lack of a comparable institutional framework in Mexico introduces another aspect of political risk into the North American energy equation.

### *National Values*

As the foregoing illustrates, interest groups favoring free trade and investment adopted an effective strategy to counter their opponents. They successfully appealed to fundamental values, most importantly economic well being, without slighting the legitimate concerns of opponents. Public opinion has at least acquiesced to NAFTA in the three countries. Nevertheless, a cautionary note should be made, because skepticism regarding NAFTA continues to exist, posing some risk and uncertainty. This leads inexorably to the role of widely held public values. In both Canada and Mexico, resentment against the United States, which overwhelms its partners in gross domestic product and total trade, has occasionally erupted. The leaders of the three nations have successfully contained the potential for chauvinistic sentiments since the signing of NAFTA. Nevertheless, there are potential sources of disruption that can stem from the ignoring of national values. The energy provision of NAFTA, for instance, was carefully ambiguous on many of the potential sources of conflict – the “hot spots” in energy trade relationships across the continent including the status of Mexico’s (and Canada’s) state monopolies, reciprocity in energy trade, and so on.

Considering Canada first, a number of important public values in that nation that could lead to heated controversy. While all Canadian interviewees for our study agreed that anti-American sentiment and excessive nationalism are *currently* a dead letter, the very reason that the Liberals did so well in the 1996 election was precisely because of growing nationalism (separatism). The nationalistic parties in both Quebec and British Columbia split votes from the other parties – which is why they did so poorly and the Liberals so well.

In addition, there is considerable public attachment to the “idea of the North,” a notion different from environmentalism. This concept is essentially that a vast North –a significant energy storehouse – should remain in its pristine state, that Canada’s uniqueness, in part, stems from this vast area and it should not be destroyed. This, of course, does not mean that energy resources should never be touched in the north. Rather, any economic exploitation of the North must carefully avoid transforming the unique nature of the area. Similarly, Canadians have become very sensitive to the legitimate concerns of the native peoples, who often reject energy-related activities on or near the areas they inhabit. In part this overlaps the “idea of the North,” but it is a different consideration. Enhanced sensitivity to the different values of the native peoples and other factors contribute to the now-widely-held public sentiment that can easily be affronted by straightforward business deals. In this respect, it is important to appreciate that Prime Minister Chrétien, because of family relationships and the earlier phase of his political career, is particularly sensitive to the issue of native claims. Finally, one should point to the widely held national value that Crown Lands, again embracing vast areas, should be touched very lightly. When all is said and done, however, these public values should not constitute a threat to the robust development of free trade and investment between Canada and the United States, but they may contribute to transactions costs.

Mexico’s public values are very different from those that prevail in the United States and Canada, and the potential for serious conflict is much greater in the Mexican case. Every Mexican correspondent observed two important values that have the potential for seriously interfering with free trade and investment in energy goods. Products that are extracted from the ground, in contrast to invisible and intangible products such as telecommunications, and funds transfers are widely viewed as inexorably and inherently belonging to the Mexican people. This, of course, is much more the case with oil and

gas than it is with electricity. The 1938 nationalization of foreign-owned oil deposits was a seminal event in Mexican history, signaling Mexican defiance of U.S. alleged arrogance and domination of Mexican resources. Mexico, a country that desperately needs foreign investment and technological improvements in its energy sector, this year produced a coin to commemorate the 1938 expropriation of the oil industry.

When one couples the tenaciously held belief that the products coming from the land belong to the Mexican people with the long standing anti “Yanqui” sentiment and the deeply felt resentment against a perceived U.S. view that Mexicans are inferior, one can understand the resistance – or, at least, the suspicion – of much of the Mexican citizenry to trade liberalization of energy goods. Throw into the pot Pemex and CFE resistance to foreign competition, resistance of trade unions fearful of job losses associated with energy sector (and general economic) reform and the reluctance of many in the PRI to join in the liberalization programs of the Salinas and Zedillo technocratic administrations, and the future is murky indeed. It is not surprising, therefore, to see some reassessment of and backtracking on the Salinas regime’s past accomplishments. There may be philosophical inconsistencies in the policies adopted between these two administrations, but a look at the political variables helps to explain them, as it does the ambiguous structure of NAFTA’s Energy Chapter and other sections of the NAFTA that affect energy.

### *The NAFTA and the Energy Chapter*

The NAFTA itself is certainly a source of political tension that does, and will continue to, affect North American natural gas and electricity markets and integration. A simple free trade agreement could have been written in three pages. NAFTA, in contrast, is a thick volume replete with compromises reflecting the political context spelled out in the preceding sections. It is probably accurate to assert that NAFTA represents a move in the *direction* of free trade, at least with respect to energy, rather than a full-scale commitment to free trade. The NAFTA, and not only the energy chapter, is replete with constraints, as spelled out in our analysis of legal considerations for North American energy trade. Some of the more important constraints from a political risk perspective are these.

- Article 601, paragraph 1, for example, inserted in Chapter 6 (energy) at Mexico’s insistence, emphasizes that the NAFTA may not violate the Mexican Constitution, which precludes foreign investment in the upstream oil and gas sectors and electricity generation. While NAFTA permits private companies of the three countries to own or invest in or operate electric generation facilities for their “own use,” excess power not used by a privately owned facility must be sold to CFE under terms agreed upon by the facility owner and CFE.
- While Chapter 11 restricts the signator nations from discriminating in favor of their own nationals, Section 603.6 permits Pemex to retain monopoly control of import and export licenses and other sections enable continued monopoly power for both Mexican and Canadian entities.
- Mexican government oil and gas and electricity procurement of equipment and services will only gradually, over a ten-year period, be opened to Canadian and U.S. competition.
- There is considerable ambiguity concerning the level of taxes that Mexico may impose on power sales in that nation.

One of the main sources of contention is how disputes are likely to be handled. The dispute resolution institutions in NAFTA are weak and considerable ambiguity exists. (The NAFTA has yet to be tested in disputes centered on energy transactions but it almost certainly will be.) Outside of NAFTA, the Canadian tradition appears to be problem solving through politics, because much of the

resource and infrastructure base is government-owned. In the U.S., it seems that corporate dispute resolution is most preferred, most likely because of the inefficiency and high cost of litigation in American courts. Furthermore, Americans generally feel that political intervention increases rather than decreases conflict. In Mexico, disputes are solved in a closed manner – probably a result of (and contributor to) the corruption in place. With respect to disputes on specific energy issues stemming from reform, for instance on pipeline tariffs or certification of new facilities, there is no way to guess how the courts would respond because there are no precedents (save for decisions on comparable issues in Canada and U.S., and relying on these precedents would surely raise political conflict). The lack of precedents and related issues of predictability in jurisprudence add to the risk of contracting and investing.

One could go on delineating the national protections, the counter moves toward free trade and the ambiguities embodied within NAFTA. The bottom line is that with respect to energy, NAFTA is a mixed bag that falls far short of a full-scale commitment to free trade and investment, both reflects and contributes to political risk and uncertainty and does not provide a clear road map for seamless cross-border transactions. NAFTA, thus, mirrors all of the contradictions described earlier. Certainly, Mexico’s technocratic elite recognizes the enormous benefits of free trade and investment for the nation’s development. But are they willing to pay the political price? It is clear that the price will be lower if the foreign intrusion is technology intensive rather than labor intensive. Nothing more clearly illustrates these tensions than the petrochemicals privatization.

### *The Role of Regulation*

A participant in our study pointed out that one of the most important and yet often overlooked aspects of effective regulation is that it be predictable. This reduces risk and uncertainty and consequently the costs of investment. As with other arenas of the North American political context, the role of regulation varies across the continent. (The Appendix describes briefly regulatory practices in each of the NAFTA countries.) The link between regulation and energy trade has always existed, both within the U.S. and Canada as well as between the three nations, but that link may become more important as physical grids become more strongly integrated. Finally, regulation is imbued with political conflict since it is an arrangement of private and public interests that often are not aligned in compatible ways. Thus, several considerations with respect to the role regulation plays in North American energy integration should be discussed.

First is the combination of interests orbiting regulatory issues across the continent. We have noted that substantial decision making power resides at the provincial and state levels in Canada and the U.S. Many questions of energy policy and regulation are not addressed in Ottawa and Washington, but rather they are provincial and state decisions or initiatives. By comparison, Mexico’s system is heavily centralized. We have also noted that informal communication among various entities exists. This goes beyond communication among government bodies. For example, the Alberta Energy Utilities Board, the California Public Utilities Commission, Pemex and the CRE are regularly in touch about most issues with respect to natural gas trade among California, Alberta and Mexico. Thus, we have two sub-national jurisdictions (provincial in Canada, state in the U.S.), a national government body (the CRE in Mexico) and a national monopoly (Pemex), all interacting without the participation of Canadian or U.S. federal interests.

A second consideration is the rapid rate of changing regulatory schemes across all three countries. Generally, regulatory approaches are slow to change. However, our “technology drives economics drives policy” model for the natural gas and electricity industries suggests that there may be times of disruption in what is usually a fairly stable system. For the U.S. and Canada, these are times of

upheaval as national and sub-national regulators respond to rapidly changing energy markets. Eventually, as solutions are adapted across jurisdictions, the regulatory system will return to some equilibrium. For now, and into the foreseeable future, regulatory adaptation creates moving targets and has two main consequences. First, change adds to uncertainty, which always increases the risk of any investment. Second, different regulations across each country, states and provinces will promote different incentives, which will lead to different behavior. Generally, regulatory shifts in the U.S. and Canada are toward market-based approaches directed only where monopoly does and will continue to exist. There has been some progress, for instance, in implementing innovations such as incentive ratemaking in order to encourage more efficient performance. Even Mexico has made some ground in this area, with a regulatory design developed by the CRE that attempts to encourage market mechanisms. Where problems arise are in the transition from one regulatory approach to another; where traditional, cost of service regulatory approaches remain intact with their associated behaviors; and where energy trade occurs across jurisdictions that maintain different regulatory approaches.

Further complicating the issue of regulatory differentials, given the federalist regulatory systems in the U.S. and Canada, is that not all regulatory policy will change at the same time. A great deal of regulatory experimentation is taking place at this time, and approaches will be adopted that seem to work best. The timing mismatch as new approaches “diffuse” across jurisdictions will lead to inter-jurisdictional conflicts and delays. Thus, even if the regulatory shift to market-based approaches is sustained, the timing of the regulatory adaptation might inhibit changes, at least in the short term.<sup>138</sup>

Much of what we observed among North American regulatory institutions is a function of disruptions associated with natural gas industry restructuring and transition and impending similar changes for electricity. Our emphasis on value chain maximization, however, leads to a critical question of whether regulatory approaches with regard to these industries are converging as the industries themselves are growing closer together. For instance, a cursory examination of recent rate cases among Canadian provincial energy utility boards (EUBs) and U.S. state public utility commissions (PUCs) suggests that decisions are often made on individual projects without consideration for how that decision affects other segments along the value chain. Regulators and their staffs are, by necessity, narrowly focused on the specifics of each case. As time goes on, though, regulatory institutions will need to address the new realities of the energy marketplace if both producers and consumers are to benefit to their full extent.

Apart from differences in regulatory systems and the process in regulatory adaptation, distinctly different regulatory “styles” exist across the continent. Among the U.S. states and Canadian provinces, even where regulatory technologies are most similar, deviation can be found in the relationships between regulators and client industries and regulators and consumers, the strength of consumer advocacy, and the like. One difference between Canada and the U.S. on the whole lies in the relationships between regulators and client industries. The smaller size of Canada’s energy business communities and lower social inclination toward litigation creates a more relaxed relationship between regulators and clients than is to be found in the U.S. Laws and rules that restrict communication among regulators and their staffs within individual commissions and boards appear to be much stronger in the U.S., although there is considerable variability among the states and the national commissions of both countries tend to adhere to strict ex parte rules. A difference between Canada and the U.S. on one hand and Mexico on the other is in the use of public meetings and technical conferences to deal with a variety of issues. This is a long-time practice in Canada and the U.S., at all jurisdictional levels. Following similar traditions in other arenas, the Mexican system is much less accessible. As of right now, there is no open hearing process in Mexico, but intervenors can file formal petitions and investors can meet privately with the CRE.

Our analysis dealt only with energy regulation, the control of energy resource and infrastructure development and prices or what we term economic regulation. We should note, however, that regulation in many other arenas impacts energy development and trade. Environmental, health and safety rules impact more on energy in Canada and the U.S., in many respects, than economic regulation. Tax law, corporate law, civil law and regulations flowing from these affect energy development and use heavily. Laws and regulations that affect industries tangential to energy have impact. Likewise, government oversight of energy bears implications for all other industrial and household sectors. Needless to say, dealing with the full extent of the problem is beyond the scope of our study. However, many of the implications of our analysis and the questions of harmonization, coordination, and satisfactory resolution within the framework of the NAFTA as well as the larger context of North American relationships could easily be extended to other issue areas.

### *Regionalization*

We have already referred to North America as a system of interconnected regional markets, a characterization that is certainly true in the natural gas and electricity industries. Continental energy integration hinges on the extent of regionalization but also countervailing forces from national and international market facilitation through trading, grid management and regulatory harmonization. Infrastructure constraints lead to regional markets, not continental ones. For example, a prolonged lack of west-to-east gas pipeline capacity in the U.S. may result in distinctly different natural gas markets evolving on either side of the Mississippi River. Transmission of electricity is coordinated by regional reliability councils, in which Canada is a participant. This regional system may become strengthened should power pools emerge as the choice for market mechanisms in a restructured electricity industry, and a similar west-to-east split is evident. The most likely loci for integration are where regional energy markets cross national boundaries, a trend that has been in place for some time in areas like eastern Canada and the northeastern U.S. and the southwestern U.S. and northern Mexico. Indeed, new projects in Mexico located in the dynamic U.S.-Mexico border region offer good examples of emerging cross-border regional energy integration, as do evolving patterns of gas trade between Michigan and LDCs in southern Ontario (please refer to the Appendix). In the long term, if true national grids develop so that trading can enhance the value of gas and electricity, then integration will broaden from regional markets. This would happen as actors in the market place seek better price and service, triggering infrastructure and other physical improvements that de-bottleneck natural gas and electricity supplies that currently are not accessible except to local constituencies, or as “electronic” markets for gas and electricity continue to grow.

Thus, regionalization is an important issue, but should diminish in the long run. Once transmission grids for gas and electricity take on truly national characteristics, then regionalization is not likely to inhibit integration. However, if regionalization exists because it is more efficient, then it may not be wise to force a cross-regional transportation system. A high degree of *physical* transfer of electrons or gas molecules is not necessary for effective integration if a high degree of *electronic* (financial or paper) transfer can take place. In other words, physical trade is not a necessary for free trade. In the long term, it is likely that improved technology will enable the growth of regional markets to truly international markets.

What are the political implications of regionalization when it does exist? Most obvious is how it affects the combination of interests involved in transactions. For example, there have been many informal disputes between companies and energy regulatory bodies in Canada and California. Members of both federal energy commissions hear the formal arbitration procedure. However, surprisingly, the federal policy bodies (U.S. DOE and NRCan), often have left dispute resolution to regulatory commissions in California and Alberta. A series of disputes related to long-term supply

contracts for Canadian gas to California utilities during the first half of this decade escalated sharply but the momentum of the market prevailed and the issues were settled at the state and provincial levels (with participation by the respective federal entities). With respect to regional California-Alberta gas trade, the bottom line is that any dispute will be overridden by the role Canadian gas plays (Canadian gas constitutes 40 percent of consumption in California) and the desire that Canadian companies have to sell gas in California. This is generally true in other cross-border regional markets. Following from the previous paragraphs, once regional trade is established suppliers (and customers) have incentives to expand trade to the extent possible, establishing a pattern for regional transactions to lead to an enlarged marketing scope.

Obviously, there are overlaps between systems of government and regionalization. For Canada and the U.S., the power vested in subnational levels of government can have unintended consequences. First, it may increase uncertainty and unpredictability because it adds to the political forces that can impact on the market. Secondly, states and provinces may not follow national leads, working, for instance, to make the market less free and more protectionist (or more open and competitive, depending upon driving needs). This potential source of conflict is most evident in Canada, since many of energy monopolies are Crown corporations, but it also exists widely in the U.S. in states where regulators have been sympathetic to gas and electric investor owned utility interests. For regional trade patterns to flourish and expand, the threat of political interference must be minimal.

In Mexico, the overlap raises particularly acute risks. An expectation associated with the NAFTA was that it might lead to a three-tier economy in Mexico, with the more free trade-oriented northern states prospering most from the NAFTA, states in heavily politicized Central Mexico showing mixed results and states in the impoverished south benefiting little. Unfortunately, these expectations are being realized. In addition, the U.S.-Mexico border has been referred to as a region conducive to experimentation with private investment and trade in energy. This also appears to be taking hold. The prospect therefore exists for a Balkanized energy system in Mexico that would exacerbate the apparent situation in the overall economy, with most private investment directed toward energy projects in Mexico's faster growing and more open northern tier.

### *Specific Energy Considerations in Individual Member Countries*

Up to this point, we have dealt with political risks and uncertainties within the dimension of North America as one entity, a free trade zone imbued with multiple complexities. The Appendix provides many details on historical and current conditions as well as some recent developments. We highlight several specific energy-related issues for each of the member countries that are evident from the information contained in the Appendix and that bear implications on continental integration.

#### *Canada*

- **Style of competition and antitrust control.** Apparent differences exist between Canada and the U.S. both in the competitive organization of energy companies and stringency of antitrust control.
- **Gas exports and public opinion.** Currently, public feeling against increasing exports of natural gas to the U.S. is at low ebb, but at times this has been a source of conflict that could resurface.
- **Environmentalism and exports.** Related to the above are actions against natural gas resource development that target export certification. While recent filings were settled, this is a tactic that could be repeated.

- **Conservation practices in Alberta.** Management of Crown resources is akin to prorating in U.S. producing states and raises many issues with respect to natural gas prices and deliverability.
- **Pipeline tariffs.** The Canadian preference for “rolled in” tolling as compared to U.S. “incremental” tolling has been a source of dispute. Recent FERC decisions in the U.S. suggest that this may be less of a problem in the future.
- **Crown corporations and electricity restructuring.** While some modest issues still, and will continue to, exist with respect to Canadian gas, it is the status of Canada’s Crown electricity corporations that will be a source of significant friction with the U.S. Of little comfort to U.S. companies who would like to compete in Canada’s electric power businesses is that there are as many tensions surrounding the status of Canada’s Crown corporations within Canada as between the two countries.

### *U.S.*

- **Slow LDC unbundling.** It has long been the FERC’s hope and intention that the states would much more aggressively unbundle natural gas supply and transportation at the LDC level. However, in contrast to Canada where experimentation is much more widespread and successful, relatively little has taken place on this front in the U.S. The slower paced approach can be attributed, in part, to the politics surrounding state public utility regulation of LDCs.<sup>139</sup>
- **Stranded gas.** Natural gas from many U.S. basins is not well positioned to compete in national markets because of the lack of transportation infrastructure. A persistent remaining question from the FERC’s restructuring of the interstate pipeline system is whether, and how, additional capacity will be added given market volatility. This situation may bear implications both for deliverability and local gas prices.
- **Competition with Canadian deliveries.** A source of tension between U.S. and Canadian companies that could spill into the government domain are accelerated Canadian deliveries to the U.S. particularly where stranded gas in the U.S. could compete if transportation outlets were availability.
- **Electricity restructuring – stranded assets, investor owned utilities (IOUs), PUCs and Congress.** It is quite clear from the previous two years of experience that electricity restructuring in the U.S. will be a major dynamic and disruptive force in North American energy relationships. The resolution of noncompetitive generation facilities (mostly nuclear), the resistance of many investor-owned utilities to increased competition, the barriers created by many PUCs to smooth transition (oftentimes unintentionally) and shockwaves from any attempt by Congress to impose a national solution (unless one emerges from the states themselves) are some of the more volatile issues.
- **Coal and gas.** Competition from coal as the low-cost fuel (on a Btu basis) for baseload electric power generation will continue to hold back growth in the market share for natural gas, and thus the stability in natural gas prices and markets which is essential for continental integration. Any consensus on the major environmental questions of the day, such as global warming, or an early resolution to electricity restructuring could shift the balance in favor of gas.

### *Mexico*

- **Pemex and CFE.** No matter how one views progress in Mexico, the constitutional status of Mexico’s national energy monopolies bears direct and negative implications on both energy sector management and development in Mexico and North American integration and relationships.

- **Income and subsidies.** Consumers must be able to afford energy purchases, even those that offer savings in terms of better, more convenient service. Thus, energy developments in Mexico go hand-in-hand with overall economic expansion and household wealth creation. Policies that effectively subsidized household energy purchases (as well as though that effectively taxed households unfairly) are slowly being phased out, but income levels also must rise to support market prices and infrastructure development.
- **Gas import tariffs.** The ten-year phase out of import tariffs on natural gas exported to Mexico is a source of contention among U.S. and Canadian natural gas companies with business interests south of the border. Our conclusion is that this is less of a problem in reality because the low wellhead cost of Pemex gas that is produced in association with crude oil makes it difficult for imported natural gas to compete regardless of tariffs. Larger problems loom in the competitive structure of Mexico's industry (Pemex's role as monopoly supplier within Mexico) and in the prospects for internal demand (as discussed in the preceding point).
- **Central planning for electricity.** Mexico's heavily centralized planning process may lead to the same types of mistakes in the electricity sector as were made in the U.S. and Canada when policy superseded market forces. In addition, bureaucratic ineffectiveness at the CFE results in much inefficiency in Mexico's electricity system that, if made apparent, could significantly impact estimates of required capacity additions.
- **Closed door to expanded cross-border electricity trade.** Related to the above, an obvious solution for many of Mexico's electric power needs in the U.S.-Mexico border region could be resolved, at least for a substantial time period, with expanded cross-border trade. (Likewise, surplus electricity could be traded into the U.S.) Unwillingness to consider this option in Mexico and roadblocks thrown up by U.S. interests opposed to competition presented by wholesale power wheeling through Mexico means that scarce resources in Mexico must be committed to other, less efficient, alternatives.
- **Labor and energy.** Labor unrest surrounding energy sector reforms, coupled with turmoil as Mexico proceeds with democratic reforms, and poses many difficulties to continental integration.
- **Environmental and Indian issues associated with energy development.** We noted above that a significant, perhaps the most significant, source of tension in Mexico is devolution of Mexico's heavily centralized system of government. Environmental degradation associated with oil development and lack of income benefits from oil flowing to states with large indigenous Indian populations are related to and exacerbate the general chaos.

### *Summary and Conclusions – Key Factors and Trends*

An overarching trend around the world is the meshing of commercial trade and energy trade networks. Apart from the NAFTA region, the European Union, Mercosur (which involves Argentina, Brazil, Bolivia, Uruguay and Paraguay with Chile as an associate member) and emerging regional trade networks in southeast Asia and the FSU-Asia-Middle East all present compelling arguments for setting physical infrastructure integration within a context of trade agreements. Europe is frequently regarded to be a model for or parallel to the NAFTA regime, although NAFTA is not intended to be a common market. In comparing Europe and North America, Europe's grids have been more easily integrated physically. A main difference between the two trade regions is that in the NAFTA, the more central and powerful countries support open access, and have used regulatory actions to restructure natural gas and are moving in similar fashion on electricity. In Europe, it is the peripheral countries that would like to open natural gas and electricity grids to market forces. Stronger countries, such as France and Germany, would like to maintain a government control. Part of the debate in Europe centers on the role of regulation in forcing market-based options, including whether that function should reside at the European Commission level or at the member country level (where

the United Kingdom is the best example of aggressive, some say overly so, regulatory restructuring). The U.S. is an often-cited example of mistakes that should be avoided with respect to energy policy and regulation, Canada as a generally favorable example of successful regulatory restructuring and management.

Our analysis suggests that the effect of NAFTA has been minimal with respect to continental energy trade and regulatory integration. NAFTA is a much weaker institutional arrangement than the EU, but this might not be an undesirable situation. While the economies of EU Member States are highly integrated, integration has had some undesirable consequences (a notable example being the rigorous standards imposed on weaker economies in order to achieve monetary union). This general experience has raised suspicions about energy integration, especially with regard to the issue of whether a European Commission-level regulatory body should exist that would supersede national interests. In addition, the jury is still out on the ability for strong and weak economies to successfully combine in effective trade regimes (again, the notable example in Europe is the struggle to embrace the Central and Eastern European countries). The purpose of regulation in Mexico is to reduce uncertainties and create a more favorable environment for direct foreign investment. Therefore, a “NAFTA energy regulatory code” might not be the answer, because not only would there be problems with the effectiveness of such a code, but also with whether it would be the right code for all three countries given their respective levels of development.

Our negative finding is softened by two forces presently taking place that are desirable and sufficiently similar, which demonstrates that the three countries may be more integrated than one might think if in other ways. One is movement in general toward greater reliance on markets in all three countries. Second are energy regulatory developments, specifically in Mexico, that could only have taken place as the institutional contexts became increasingly market friendly.

Not all changes on the horizon for North America are likely to be market-based. Though the vast majority of experts consulted for this study, within industry and government circles, have shown a willingness to increase reliance on market solutions, there will always be a tendency to take care of the “what-ifs” with non-market solutions. Supply shortages and energy price volatility will always be a serious threat to initiatives in any of the three nations, in particular when mixed with long histories of exercising government control in times of perceived crisis. Historical precedent will make the transfer of responsibility from public to private domains a slow process, even slower where government control has been strongest. The most likely way to succeed in overcoming resistance to market-based solutions for energy and a consequent broadening of continental natural gas and electricity trade and market efficiencies is to begin slowly with pilot projects, or smaller experiments. The success of these projects will likely help to convince the skeptical. Here, signs are encouraging not only with respect to the border regions and in particular Mexico’s, but with demonstrations that are opening doors to market-based solutions throughout Canada and the U.S.

### **The Evaluation of Technology Transfer in this Study**

Apart from the normative question of whether continental energy integration is desirable, which our study does not attempt to address directly, there is the more practical question of the extent to which integration is technologically achievable. The old adage that natural gas is a “local business” still bears considerable truth simply because of technological constraints. Because natural gas must be shipped in a pipeline, the final cost to a customer rises the further away that customer is from the resource. Indeed, the natural gas industry in the U.S. and Canada was born with the earliest LDCs, which first delivered gas manufactured from coal (town gas) to local customers and later natural gas when it was discovered. It was only when immense natural gas resources in the southwestern U.S. and western Alberta in Canada were found during the early 1900s that long-distance shipments of

natural gas and the inter-jurisdictional transportation grids in the U.S. and later Canada came into being (with considerable help from strong winter heating markets in both countries). In spite of these historical developments, the North American continent remains heavily regionalized for gas, albeit in much larger geographies than the earliest days of the industry, and largely dependent on final delivery by LDCs. Gas from certain remote basins cannot compete well and the timing for transportation improvements to alter this situation is fuzzy. Much of the prospective natural gas resource base in the U.S. is “nonconventional” gas, associated with coal beds or trapped in tight sand or shale reservoirs, and is more costly to produce. Thus, markets for nonconventional gas may largely be regional. A typical continental exchange actually is accomplished via “backhauling.” Contrary to advertisement, it is unlikely that Canadian gas molecules will ever actually reach markets in Mexico. Rather, Mexican customers will receive U.S. gas that might have been destined for some other location U.S. while Canadian gas is used for displacement.

The situation for electricity is similar. Line loss from existing transmission grid wires makes long-distance shipment of electricity impractical. The physical attributes of electricity make control of the flow of electrons a technical and regulatory challenge. Electrons find the path of least resistance, which makes it difficult for, say, actual Canadian electrons to reach a customer in Mexico. However, electricity represents a way for natural gas to reach new markets, hence the “gas over the wire” analogy used by many energy analysts. In addition, natural gas has become the marginal fuel for electric power production in the U.S. and increasingly so for Canada, driving the industry convergence that we see today.

What has previously been made clear is that the level of success of continental energy integration will always depend partly on the success of new technology. Even for the most rudimentary types of continental cross-jurisdictional energy exchanges to occur, there must be reasonably harmonious regulatory pathways so that regulatory frameworks across the three NAFTA partners are adjusted to technological changes in a similar manner. Consequently, the transfer of technology, including “regulatory technology,” (the rules and norms used by regulatory bodies) is essential for integration. Thus, in addition to the foregoing legal and political analysis, our study investigates the mechanisms of technological transfer that allow technological developments to enhance energy integration, through improved communication among industries and regulatory agencies across jurisdictions.

## *Overview*

Technology transfer is generally difficult in a purely domestic situation, but it is even more so in the international arena. This is because the differences in national cultures, social norms, laws, economies, etc., set up impediments to technology transfer that are not present in a domestic economy. In addition, international technology transfer usually involves a long-lived relationship between organizations in different countries, beyond that of a relatively short-term relationship generally involved in simple trade.<sup>140</sup> What should management focus on? What are the major problems? What are some important strategies, and how can these strategies be successfully implemented?

Technology transfer can best be understood as a process by which “know-how” information called technology is transferred across a boundary or boundaries to another organizational entity. The technology can be transferred in its pure informational form, which has been called “disembodied” technology transfer. Or, the technology can be “embodied” in the form of a product, machine, process, or person and then transferred. The advantage of an embodied form of transfer is that the person, machine, software and so on “packages” the know-how in a way that makes the technology able to be implemented. Often, a combination of embodied transfers are made whereby machinery and the personnel to operate them are transferred at the same time.<sup>141</sup>

By taking a process view, it is easier to understand the context in which international technology transfer takes place. The context can be better understood by examining the barriers, or impediments, to technology transfer, as well as the bonds, or bridges, that enhance the transfer. These barriers and bonds exist between the home or supplier country and the host or recipient country. Broadly speaking, the home or host countries can have two categories of factors that can act as barriers or bonds to technology transfer.<sup>142</sup> First, political/legal factors such as laws, trade policies, tariffs, and licensing regulations can be barriers or bonds to technology transfer. Second, economic/technological/social factors that exist in the home or host countries can serve as barriers or bonds to transfer.

Firms seek to develop strategies and implementation modes that can either overcome a barrier to transfer or that can take advantage of a potential bond to enhance transfer. Firms that have succeeded in international technology transfer, such as IBM, Philips, Merck and General Electric have demonstrated successful strategies and implementation modes to achieve transfer technology.<sup>143</sup>

### ***Barriers that Inhibit Technology Transfer***

The home or supplier country, or the host or recipient country, may pose constraining factors that can act as barriers to the free transfer of products, processes, or personnel to other countries. Often, a home country is concerned about the exportation of jobs, the creation of competition in the host country or a threat to national security. The host country may be concerned about damage to the competitive strength of firms in its country, a possible loss of jobs and even "economic imperialism" from a foreign country.<sup>144</sup>

#### *Home Country Barriers*

There are many examples of home country issues that result in barriers to technology transfer. U.S. defense contractors were worried about possible competition to their business that could result if Japan were allowed to re-arm, or to use U.S. technology to develop weapon systems. West German camera firms were dismayed in the 1960s when Japanese firms came to visit and learn about photo technology. The subsequent result was the creation of severe competition in a market where West German firms were known for top product quality. Similar concerns pervaded negotiations between the U.S. and Japan in the late 1980s over the joint development of the so-called FSX advanced jet fighter project for Japan's air force by General Dynamics and Mitsubishi Heavy Industries. The U.S. Commerce Department feared that Japan would obtain the technology to launch its own commercial aviation industry in competition with the currently dominant U.S.<sup>145</sup>

The U.S. and its NATO allies tried very hard during the Cold War years to prevent the transfer of sensitive technology to the Soviet Union that could be a threat to national security. Such items as sophisticated computers and machine tools with possible military applications and nuclear material were banned for export to the Soviet Union or its allied countries.

Barriers are created when home countries react to perceived threats. Firms in a home country may try to suppress the transfer of technology abroad as a strategy for the control of an important technological resource. For example, a firm may patent a large number of related products and then market only a limited range of new products with patent protection for the rest. U.S. government officials have charged that such companies as Toshiba, NEC and Hitachi each file for over 10,000 patents every year in Japan. This situation causes delays of several years in the Japanese patent office to the detriment of U.S. companies like Corning Glass Works and Fusion Systems who have had their patent applications waiting. Firms may also pool patents as a means of limiting competition. When a license is negotiated

for a product a firm may limit the conditions and fields of use for the product as a way of controlling the diffusion of the technology.<sup>146</sup> These strategies for the control of technology can act as a barrier to the transfer of technology to another country.

Embodied transfer of technology with respect to personnel can be extremely sensitive. Communist countries such as the old Soviet Union and East Germany emphasized exit-visa restrictions or used the Berlin Wall as barriers to the transfer of technology embodied in personnel – a "brain drain." Other countries have tried to limit attendance at foreign schools or conferences by scientists and engineers to prevent brain drain. The People's Republic of China has had a particular problem in trying to lure back personnel who were sent to Western countries for training in science or engineering, and generated better career opportunities for themselves outside of China. The brain drain problem often means that less developed countries are not able to develop a core of technically sophisticated personnel who can help their country to absorb and diffuse technology transferred from a more advanced country.<sup>147</sup>

### *Host Country Barriers*

Host or recipient countries can also erect barriers to technology transfer. Again, the concern here is a potential loss of jobs or damage to the competitive ability of host-country firms. Examples are the "Buy American," "Buy Japanese," or "Buy German" laws or customs in the telecommunications industry that were designed to increase domestic employment from government or government-related purchases and to reduce foreign inroads in domestic areas of technological strengths. Often, a technology can be designed to give domestic firms an advantage vis-a-vis technologies used by foreign firms. Telecommunications technology compatibility is one such case. Some have seen the acquisition by Siemens of IBM's Rolm telephone-equipment business as a means to overcome barriers in the North American market. AT&T's agreement with the state-owned telephone company of Italy in order to enter that market is a similar strategy. Another example of a barrier built around technology is Japan's choice of an operating system for educational computers developed by Matsushita Electric Industrial. U.S. trade officials charged that American computers that were designed to run on MS-DOS or UNIX operating systems faced an unfair barrier.<sup>148</sup>

In effect, it might be charged that many barriers to technology transfer are attempts by governments to pursue a policy of "technology-based mercantilism." Early nation-states often tried to protect manufacturers at home while promoting exports abroad. Now, some governments seek to protect their home technological bases through barriers to entry. Developed countries such as the U.S., Canada, Japan, Germany, and France often have adopted the strategies of less developed countries through the use of patent and copyright policies, restrictions on foreign investment, tax policies and government purchase policies.<sup>149</sup>

Lack of compatible or existing industrial standards in the host country can constrain technology transfer. Thousands of standards are normally required for a modern economy to function efficiently, and if these standards are different or nonexistent in the host country, the costs of modification can be considerable. For example, industrialized countries almost always have standards for electrical voltage, metrication of weights and measures, threading of fasteners, dimensions of roadways or railroads, radio and television frequencies, building codes and the like. Some countries may resist the adoption of common standards from abroad due to sensitivities that to do so would be subversive in some way to national sovereignty or pride. As Holland's Philips group has found, however, many electronic products must interface with components made by other companies, thereby increasing the importance of standardization.<sup>150</sup> Thus, any divergence in these industrial standards between home and host countries can impede technology transfer.

Incompatible cultural values between a multinational company (MNC) in a developed home country and a host organization in a less developed country may act as a barrier. For example, technology transfer from a country such as Germany, where assertiveness and achievement are valued, to a country such as India, where values are in the direction of social relationships over money and achievement, may be difficult because of the ability of India's society to absorb that technology. India also has a traditional and structured power system, so technologies that might tend to disturb that power system may also be resisted. A technology embodied in a process or person, moreover, would tend to have cultural factors as a more serious barrier than technologies embodied in a product or those that are disembodied in only informational form.<sup>151</sup>

### ***Transfer of Energy Technologies and North American Energy Integration***

In addition to the obvious factors that promote integration, such as the potential growth in demand for natural gas and electricity and consequent acceleration in infrastructure development, the opportunity for physical technology transfer will continue to serve as one of the most important incentives in the move toward open and free markets. Efficient and market-responsive development of natural gas resources is essential for effective natural gas transactions. This requires that the most effective technologies be implemented through sound management practices in order to meet this challenge. Pipeline systems must be able to interface seamlessly, which requires comparable technologies for everything from construction to operation and maintenance. De-bottlenecking the electric power system requires the best technologies for generation, transmission and distribution and smooth coordination across the three functions. Widespread trading and marketing, which facilitates continental transactions, flows and balances, requires the best information technology systems and management practices to coordinate those systems. Given all of these requirements, it is clear that flaws anywhere in the system will cause disruptions or delays and that access to technology is essential, in spite of the competitive issues for individual companies.

Technology transfer is commonplace between the U.S. and Canada because the more fluid border provides incentives to share that technology. Canadian and U.S. energy companies employ the same technologies, and many of the same management practices, because of cross-border ownership of companies, cross-border training of technical personnel at universities and other institutions, shared research or access to research or because of access through oil and gas service firms that operate heavily in both countries.

The situation in Mexico is, of course, not the same. Obviously, no cross-border ownership of energy companies in Mexico has existed since the 1938 expropriation. Mexican energy professionals have traditionally accessed training at Canadian, U.S. or other international universities and institutions, but this tends to be at elite levels. Mexico's Instituto Mexicanos del Petroleo (IMP), the national research arm for oil and gas, is certainly on a par with similar institutions around the world but subject to national budget constraints and related politics. The relationship between IMP and Pemex over the years has been a source of some contention. Finally, access to technology through international oil and gas service companies or companies that provide comparable products and services for electricity has been hampered by domestic protections in Mexico stemming from the political power of small energy service companies fearful of competition. As with natural gas import tariffs, Mexico was successful in obtaining a phased reduction in import tariffs on energy-related equipment and services to appease political opposition at home (refer to the section on legal issues, above).

Though technology transfer is not yet as strong between Mexico and CUS, the *opportunities* for technology transfer should offer strong incentives to Mexico to continue progress with energy sector reform. For example, access to proprietary energy technology, because it is one of the most effective marketing tools that U.S. and Canadian (or other foreign) companies have, could become a major driving force for change in Mexico. Lend-lease programs are examples of policies that facilitate at least some proprietary technology transfer. However, there must be incentives to share proprietary technology. Managers at energy companies in Canada and the U.S. must feel that there is a reasonable chance of successfully attaining new business opportunities in Mexico's natural gas and electricity industries. Provision of proprietary technology then becomes a strategic tool for positioning. Once implemented, the process of transfer begins as Mexican professionals begin to acquire knowledge and experience with the new technologies. Without commercial incentives, transfers of sophisticated energy technologies that Mexico needs are much less likely to occur. The best example of this problem is with respect to upstream (exploration and production) technologies. Many major operating companies in the U.S. have provided Pemex personnel access to data and technologies, including some training, in the hopes of participating in Mexico's oil and gas production. The realization that this part of Mexico's energy sector remains firmly closed has made U.S. companies wary of continuing to provide this type of assistance. The best example of technology transfer as a result of business incentives is the deployment of high-efficiency gas combined cycle turbines in new electric power projects in Mexico as a result of foreign participation through successful bid competition.

Mexico's energy companies are certainly able to acquire "off the shelf" technologies and, through turnkey contracts for services, the knowledge required to fully benefit from these technologies. The best examples generated through our interviews are drilling contracts that give Pemex some access to state-of-the-art upstream technologies widely available through oil and gas service companies and conversion of the Pemex natural gas pipeline system to SCADA (Supervisory Control and Data Acquisition), a widely used systems management program for pipeline and electricity grids. Acquisition and deployment of state-of-the-art natural gas turbines for electric power generation are another example. State-of-the-art compressors for pipeline and distribution systems and meters for both natural gas and electricity are also on the shopping list. With all of these technologies, the major barriers are financial constraints on the part of Mexico's energy companies (but this is also the most widely cited incentive that Mexico's companies might have for partnering with U.S., Canadian or other foreign developers or for the Mexican government to take the significant step toward privatizing its national monopolies).

Energy company professionals regularly collaborate and share information. This has long been the case in the earth science and engineering disciplines through organizations like the American Association of Petroleum Geologists, Society of Economic Geophysicists, Society of Petroleum Engineers, American Society of Mechanical Engineers, Institute of Electrical Engineers and so on, all of which are international in scope but at the individual professional level. Where Mexico's energy companies have been less visible are in industry trade associations. The participation of Pemex's Gas and Basic Petrochemicals subsidiary in the Interstate Natural Gas Association of America (INGAA), the major interstate pipeline organization which has taken on a more international flavor in recent years, is one example. INGAA provides regular programs for its members that update them on technical and policy developments in the worldwide natural gas pipeline industry.

A distinctive problem in Mexico, likely to be found in other developing countries, is that the managers of state enterprises like Pemex and the CFE are less likely to have the freedom to incorporate changes in accordance with technological improvements. U.S. energy technology specialists who have interacted with Mexico's energy companies note that managers there are learning new technologies, but are less likely to implement them. The strong relationship between

national monopolies and national budgets, and resulting impediments to re-investment among state owned enterprises, is the source of much management inertia.

### ***Energy Regulatory Technology in North America***

While the transfer of advances in energy technology are relatively smooth across Canada and the U.S., regulatory technology advancement and diffusion often lags behind.<sup>152</sup> Advances in regulatory technology are the developments by regulatory bodies that allow industry to react more efficiently and effectively to changing conditions, such as technological and related industry economics, and improvements in the ways to reconcile the public interest with fair competition rules. One of the most important impediments to integration within NAFTA, according to one observer, is the lack of regulatory harmonization between the two countries. Though there has been improved communication between regulatory organizations such as the FERC and the NEB, the decision making process is still very separate, which could ultimately cause conflict.<sup>153</sup>

The transfer of regulatory technologies and innovations in energy regulation within and across the NAFTA countries will be an important key to the success of energy integration. Given national differences among the U.S., Canada and Mexico in energy policies, economics, and laws and customs, substantial barriers exist to the effective transfer of regulatory technologies from one country to another. It will be necessary for regulatory officials from the U.S., Canada and Mexico to identify the existing barriers to regulatory technology transfer. These barriers are expected to be in the areas of constitutional, legal, and administrative issues, cross-national cultural differences, economic conditions and technological specifications (agency practices and expertise).

Once these barriers have been identified, strategies can be undertaken to develop bonds to overcome barriers. These bonds may take the form of cross-national task forces or committees; "middleman" efforts such as boundary-spanning personnel, consultants or law firms; or joint ventures, cross licensing or the exchange of personnel. A key ingredient of such bonds will be the establishment of interpersonal relationships that can help to overcome the identified barriers. Some important outcomes of the identification of barriers and the development of bonds will be the initiation of direction, enthusiasm, and momentum toward regulatory coordination and integration of energy policies among the three NAFTA countries.

All of this said, there are two evident and clear obstructions to harmonization, regardless of how informal it is – the competitive interests of individual companies and resistance among regulatory bodies themselves. A long-time tradition in the politics of energy regulation in the U.S. and Canada has been the efforts by individual firms, acting rationally, to influence regulatory decision making in favor of specific interests. This extends to advances in regulatory technology, especially those intended to introduce or increase competition and encourage market-based solutions. The shift to market-based rates or negotiated rates for pipelines is one example. It may not be in the competitive interests of existing firms for regulators to adopt new practices if these rules and norms facilitate increased competition.

Existing staff at agencies may resist adopting new practices for a variety of reasons (lack of familiarity, the amount of effort involved, and belief systems about what regulation should do and how it should be carried out). They may also resist allowing industry to adopt practices that are perceived to be contrary to the public interest or that are outside of the experience of regulators (of which most market mechanisms would be). A good illustration is risk management. Considerable debate has centered upon whether LDCs, acting in the public interest, should be allowed to use sophisticated risk management programs to hedge against natural gas commodity price volatility in their supply purchase contracts. The fear is that these practices create financial risk for LDCs and supply

reliability risk for consumers. This issue has forced regulators to acquire some understanding of hedging programs and has raised commensurate debate on the design of LDC gas supply portfolios with respect to short term versus long term gas supplies. (These issues are extending to Mexico where the CRE's philosophy of relying on natural gas imports to provide competition to Pemex has created considerable seasonal price volatility in the Mexican gas marketplace. Ironically, seasonal price volatility does not ordinarily exist in Mexico, which is not characterized by strong heating season differentials. In essence, a strategy designed to introduce competition and improve reliability of supply, which has been a problem in Mexico, triggered a new set of issues as Mexican consumers became subject to price fluctuations intrinsic to the U.S. and Canadian markets. This suggests that integration without domestic competition for natural gas supply in Mexico may be problematic.)

A key method for regulatory technology transfer is the collaboration and sharing of information among regulators and their staffs. This facilitates the diffusion of regulatory methods mentioned in our review of the political aspects of regulation. While much communication is informal, there are at least two formal pathways. One, previously mentioned, is the official communique between the national energy departments of the three countries, although declining in importance. A second are the associations of provincial (Canadian Association of Members of Public Utility Tribunals, or CAMPUT) and state (National Association of Regulatory Utility Commissioners, or NARUC) regulators. These associations provide regular conferences, coordinate training programs and facilitate other exchanges that allow regulators to observe each other's approaches and include the national regulatory agencies, the NEB and the FERC. Mexico's CRE has participated to some extent in these networks. We noted that diffusion of new regulatory methods is often uneven, leading to problems for both public and private interests. While we did not rigorously review the role that professional associations play in regulatory technology transfer, it does appear that they help to speed up and smooth out the process.

Changes in industry technology and economics force adaptations in regulation and policy, but adjustments in regulatory technology can also impose adjustments on industry that are not cost-free. The goal is for the total benefits associated with implementing new practices to exceed the up front costs. An example is implementation of common standards, such as those developed through the Gas Industry Standards Board (GISB) that facilitate operational norms. In the case of GISB, this applies to information about natural gas pipeline capacities and prices supplied on electronic bulletin boards accessible to marketers and customers. Initially, with restructuring of the U.S. interstate pipeline system, companies developed and promoted proprietary systems that provided comparative advantages in retaining and recruiting new customers. From the point of view of the FERC (and NEB), open access hinges on comparable information being available to all shippers. A similar requirement exists in the FERC's restructuring rule for electricity (refer to the Appendix). The result of standardization is that mechanisms for price discovery have improved substantially. A trade off is the reduced comparative advantage that pipeline and marketing companies may have enjoyed with proprietary systems and that must be replaced through other strategies.

A risk to integration is that regulatory harmonization might be counter-productive, *if* the tendency is to adopt common practices that actually work to hinder free trade or *if* the drive to adopt favorable common practices is impeded by the system of government. In the first case, it may be that simply the formation of a regulatory body is an impediment if the alternative is a market-based approach without intervention. This is an old argument against regulatory management drawn from evidence that suggests that firms seek regulation as protection against competition in the first place, so that the mere existence of regulatory bodies constrains the marketplace. Certainly, the early history of the U.S. and Canadian gas and electricity industries would seem to support this argument. In both cases, initial development of each industry was highly competitive before the emergence of monopoly franchises managed by independent regulators. Balancing this argument is the view that a stable

investment climate is preferable for major infrastructure developments, as already discussed. In Mexico, the philosophy underlying the CRE is that the monopoly power of Mexico's national energy companies must be constrained in order to competition to take hold, and that new investors require some period of time in which they are able to recover their initial capital investment through allowed (regulated) returns.

The second point, system of government, is a more difficult matter. Our previous analysis of this issue points to both good and bad aspects of federalist systems like that in Canada and the U.S. Clearly, the larger the number of jurisdictions, the more cumbersome the process of regulatory technology transfer. Local political considerations in each jurisdiction can work to hinder integration in some obvious ways. Counteracting the negative aspects of federalism are the opportunities that might emerge from federalist systems for regional harmonization. If, as we argued above, regional energy integration is the most likely initial outcome in terms of continental energy trade arrangements, then the ability for states and provinces within these active trade areas to adopt common practices apart from national coordination (or interference) is preferable. Mexico does not have this opportunity with its centralized system of government.<sup>154</sup>

Finally, in the previous sections on political considerations we make the point that legal/institutional frameworks within North America differ, in particular between Mexico and its northern neighbors. A related set of issues exists with respect to accounting systems in Mexico. Generally, Mexico's national energy monopolies are under pressure to report results in ways that conform to public reporting by firms in Canada and the U.S. The CRE has adopted accounting practices that appear to be consistent with those used by regulatory agencies elsewhere in North America. However, reporting does not seem to be as transparent in Mexico as in Canada and the U.S. and the lack of an independent entity, like the Financial Accounting Standards Board (FASB) in the U.S., leaves Mexico without an obvious point of linkage. Differences in legal practices and financial disclosure may act as barriers to both regulatory development and the transfer of regulatory technology to Mexico.

### ***Summary and Conclusions – Key Factors and Trends***

Defining technology transfer – how it takes place, how the process can be improved and the notion that there is a technology associated with endeavors such as regulatory oversight – are more subtle but no less important features of the context for North American energy integration. Two important themes can be drawn from our analysis.

First, with respect to the transfer of hard energy technologies, one of the most important remaining questions that will work to further or inhibit integration is whether Mexico will generate incentives, in the form of sufficient commercial opportunities, for foreign companies to share their proprietary technologies. Oil and gas exploration and production technologies are problematic. The transfer of upstream technologies is inhibited by the inability for foreign private firms to participate in oil and gas production. Acquisition of “off the shelf” technology is slowed by remaining tariffs on energy products and services as a result of the NAFTA phase out. Downstream gas technologies, in particular for applications like pipeline system management, metering, repair and maintenance, should be more accessible to Mexican firms because of the CRE's restructuring and ability of foreign firms to participate in those businesses. The same will be true for electricity if sufficient commercial incentives exist. In addition, however, Mexico's national energy companies must provide incentives for their own managers to adopt and implement new technologies and knowledge.

Second, our analysis makes clear that regulatory technology transfer must be distinguished from overt policy coordination. Formulating a common regulatory code is a separate question requiring a difficult solution. What is apparent is that common practices are facilitated through informal channels. It is a

relatively easy solution to increase the level and depth of contact among officials and their staffs charged with responsible and effective oversight of natural gas and electricity development and services. In either case, we caution again that adoption of common practices that inhibit competition and market-based solutions are not preferred. Such an outcome would serve to disrupt transactions and North American energy integration, creating potential lost benefits continent-wide.

## **Overall Summary and Conclusions from Part II**

One of our key tasks was to evaluate the role of the NAFTA on the basis of the underlying assumptions for this study. We formed the following general observations.

- Overall, the NAFTA formalized a commercial trade regime for three countries already linked in a number of ways. However, it is important to acknowledge that the NAFTA is not, nor was it intended to create, a common market.
- What could not be achieved with the NAFTA is significant for the problem at hand. The NAFTA does not include a strong resolution toward competition, clear dispute mechanisms or, importantly, a level playing field for energy.

With respect to energy, the contributions of and omissions in the NAFTA are clear.

- The NAFTA instituted specific concessions for petrochemicals, natural gas, electricity and energy services.
- The NAFTA does not provide any resolution on government monopolies, formalize arrangements for energy regulatory harmonization (not that it should have) or extend the energy crisis provisions from the Canada-U.S. Free Trade Agreement to Mexico.

Given the treatment of energy in the NAFTA, the lack of clarity with respect to provisions that indirectly impact on energy and the historical, economic, political, legal and technology considerations associated with North American energy, the NAFTA provides only a weak framework for North American gas and electricity integration. Consequently, trends toward integration are and will be more heavily influenced by other factors – the historical, economic, legal, political and technology contexts for natural gas and electricity development and trade.

## **PART III. RESULTS OF SCENARIO ANALYSIS**

### **Background**

Based on our baseline assessments, as described above in Part II, we engaged in a scenario analysis in December 1996. Preparation for our scenario analysis was the responsibility of our graduate student researchers, who also participated in the daylong exercise. Scenario analysis is probably most commonly associated with business decision making (in the energy industries, most notably by Royal Dutch/Shell), although it is often relied upon in the public sector (an example is *Europe 2000*, the European Commission's 1996 forecast of energy supply and demand balances incorporating various scenarios). Many issues surround the development and use of scenarios, including over- or under-prediction, a tendency to look for confirming evidence, development of too many alternative futures, inadequate involvement of different disciplines and upper management within an organization (for business applications) and approaches to the scenario building process that are too casual rather than rigorous and exacting.

The alternative futures we analyzed were based on the two questions posed in Part I.

- *Will the process for electricity restructuring parallel natural gas restructuring in Canada and the U.S.?* This question constitutes Alternative Future 1, “A CUS System for Electricity.” It suggests that a “single market” for electricity emerges between Canada and the U.S. that mimics the highly integrated natural gas system. Alternative Future 1 is considered to be the one we “know,” based on the history of Canada-U.S. natural gas trade relationships and industry and regulatory development. Alternative Future 1 also allows us to explore the first of the “conventional wisdoms” presented in Part I, “*Canada and the U.S. maintain the most seamless border in the world; there are no real issues for Canada/U.S. integration.*”
- *How does Mexico fit into the Canada-U.S. (CUS) market relationship and process?* This question constitutes Alternative Future 2, “Mexico Joins the CUS.” This future is considered to be the unknown, and captures the hypothesized integration of Mexico with its NAFTA partners as a result of the new trade regime itself and economic pressures, with a resulting opening in Mexico’s energy sector. Alternative Future 2 allows us to investigate the second and third of the conventional wisdoms from Part I, “*In general, the NAFTA will lead to a balanced commercial trade regime despite differing levels of development among the countries because the new regime will help to ‘bring Mexico along,’*” and “*Even though energy was not a significant component of the NAFTA, market reforms elsewhere in Mexico’s system will create pressure for significant restructuring of Mexico’s energy sector.*”

As we point out at the start, neither of these questions is new or unique. Rather, each is consistently and heavily discussed. The conventional wisdom in industry, government and academic circles is that both of these futures will eventually happen. The experiment we conducted as an objective, unbiased research team was to test the validity of conventional wisdom within the ten-year time frame for our analysis and, in the course of doing so, to identify and evaluate the key uncertainties. We selected a ten-year horizon (to 2006) because it took about this long for Canadian producers and pipeline companies to establish export markets for natural gas in the U.S. Ten years is the time frame widely accepted for electricity restructuring in Canada and the U.S. And ten years is what we expect to be required for certain investments in Mexico to generate positive returns.

The following table illustrates how our application of scenario analysis compares to what is typically implemented in business applications, and the specific criteria that we used.

**Table 3. Scenario Analysis Methodology and Application**

<b>Scenario Concepts</b>	
<i>Typical Criteria for Business Application</i>	<i>UH Study Team Application</i>
<ul style="list-style-type: none"> <li>• Goal – analyze alternative futures for the development of business strategies.</li> </ul>	<ul style="list-style-type: none"> <li>• Goal – analyze alternative futures in order to evaluate key uncertainties for integrating the gas and electricity markets in North America.</li> </ul>
<ul style="list-style-type: none"> <li>• Understand the present – the process of predicting alternative futures generates a better understanding of the present situation.</li> </ul>	<ul style="list-style-type: none"> <li>• Understanding the future possibilities helps us analyze the present barriers for open market trade among the three nations.</li> </ul>
<ul style="list-style-type: none"> <li>• Derive different indicators of alternative futures or changes in industry so that quick decisions about strategies can be made as soon as changes occur.</li> </ul>	<ul style="list-style-type: none"> <li>• Formulate recommendations for how barriers to trade and integration can be reduced and how risks and uncertainties can be dealt with.</li> </ul>

<b>Essential Elements of Analysis<sup>155</sup></b>	
<i>Typical Criteria for Business Application</i>	<i>UH Study Team Application</i>
<ul style="list-style-type: none"> <li>• Scope of analysis.</li> </ul>	<ul style="list-style-type: none"> <li>• Natural gas and electricity systems.</li> <li>• Federal and state/provincial jurisdiction in Canada, the U.S. and Mexico.</li> <li>• Ten-year time frame.</li> <li>• Past sources of uncertainty: resource availability and price, resource trade, commitment to market-based solutions.</li> </ul>
<ul style="list-style-type: none"> <li>• Driving forces – ongoing forces that help to shape the future.</li> </ul>	<ul style="list-style-type: none"> <li>• Basic trends – greater reliance on competition in the natural gas and electric power industries, convergence of the gas and power industries, technology-driven restructurings of industry, regulation, policy.</li> </ul>
<ul style="list-style-type: none"> <li>• Predetermined elements – factors or events that have not already occurred but are very likely to occur because of what is already “in the pipeline.”</li> </ul>	<p><i>Natural Gas (refer to the Appendix)</i></p> <ul style="list-style-type: none"> <li>• Canada – emergence of Alberta trading hub and futures contract, continued development of export program with new international pipeline capacity; increased competition at retail level.</li> <li>• U.S. – price pressure from Canadian imports, improved position of Rocky Mountains with new pipeline capacity, increased pressure for retail competition.</li> <li>• Mexico – greater choice for industrial customers, expansion of resource base and progress toward position as net exporter.</li> </ul> <p><i>Electricity</i></p> <ul style="list-style-type: none"> <li>• Canada – “unbundling” vertically integrated utilities, competition in wholesale (industrial or “bulk”) market, introduction of “customer choice” at retail level, expansion of exports from Crown corporations (Ontario Hydro and Hydro Quebec).</li> <li>• U.S. – unbundling vertically integrated utilities, competition in wholesale market, introduction of customer choice at retail level, price pressure from Canadian imports, convergence of gas and electricity enterprises.</li> <li>• Mexico – private investment in generation in selected facilities, greater choice for industrial users principally through “inside the fence” (generation for self-use) projects.</li> </ul>

<ul style="list-style-type: none"> <li>• Key uncertainties – important factors or events that could change the future.</li> </ul>	<ul style="list-style-type: none"> <li>• Identified within the broad issue categories of publicness, governance, timing and economic development and analyzed from five disciplinary perspectives – historical, economic, political, legal, technology management.</li> </ul>
<ul style="list-style-type: none"> <li>• Prime movers – key individuals and organizations that can alter the future through their independent actions.</li> </ul>	<ul style="list-style-type: none"> <li>• Major stakeholders – industrial users, ratepayers (retail customers), potential new industrial users (“energy entrepreneurs”), regulators (federal, state, provincial), existing energy suppliers, environmentalists.</li> </ul>

## Outcomes

### Alternative Future 1: A CUS System for Electricity

In Alternative Future 1, the process for electricity restructuring parallels natural gas restructuring in Canada and the U.S.

**The story:** The CUS continues to develop as an integrated market for natural gas. Strong parallels continue to exist within the CUS that support this relationship (commitment to markets and competition, similar legal/policy/regulatory institutions and approaches, similar industry maturities, structure and technology). It is relatively easy for Canadian gas to find its way into U.S. markets, and U.S. gas finds its way to Canada where there are cost and/or service advantages. While most international trade occurs at or near the border, Canadian shippers continue to penetrate and build large U.S. markets. A similar regime for electricity develops with open access, unbundling to facilitate growth in third party marketing, increasing competition in the bulk power segment and eventually customer choice for retail users. Canadian and U.S. energy entrepreneurs are able to build portfolios that can compete in price and service using both Canadian and U.S. gas and electricity and operate widely (among provinces and states) on either side of the international border. Markets for electric power and international trade – CUS integration for electricity – is well established within a ten-year time frame (about the same amount of time required for natural gas market development and integration).

Having framed Alternative Future 1, we identified a number of key uncertainties within our issue categories, as shown below, which are quite revealing of present barriers and constraints.

**I. “Publicness”** (The nature of “public interest” in its historical usage, ownership and operation of public companies, and whether this is the same concept as “monopoly.” Importantly, within any commercial trade regime, “privatization” does not necessarily lead to free trade if the result is private monopoly or oligopoly that can exert market power.)

#### **A. Historical**

- *Energy too important to be left to mere market forces.* Occasionally, generally during times of perceived crisis (shortage and high prices), both Canada and the U.S. have intervened heavily in their energy markets. During the ten-year time frame for our analysis, we do not consider this to

be a likely event. Conflict over the proper transition for electricity could cloud the picture, however.

- *Dominance of the natural monopoly concept.* A common idea is that competition in the sale of the commodities, gas and electricity, can be achieved but physical systems have natural monopoly characteristics. The reluctance to abandon or limit the traditional natural monopoly model may be more difficult for electricity than gas.
- *Nationalization of electricity in Canada after World War II was never reverted.* Canada's Crown corporations are firmly established.
- *CUS Free Trade Agreement (the FTA, precursor to the NAFTA) solidified voluntary steps toward markets for gas.* The NAFTA does not provide a similar incentive for electricity.

#### **B. Economic**

- *Ownership of resources.* Private ownership of resources with property rights and transparency in pricing is generally regarded to be the most efficient means of economic organization. Arguments to the contrary generally rest on equity considerations – social, environmental or otherwise – which underlie much opposition to electricity restructuring.
- *Public service.* Public utility economics incorporates the concept of public service. Traditionally, tariffs have been set so as to facilitate universal service. The implicit cross-subsidies are, in part, driving restructuring as large customers seek better value. Electric utilities, whether private, investor-owned or publicly owned, generally have borne the cost and responsibility of “the obligation to serve” (but also the security of regulated rates of return in exchange for taking on that obligation). “Reliability,” the question of whether market-based provision of electricity would be as secure as service by regulated utilities, may act against electricity restructuring and CUS integration by preserving the role of monopoly utilities and Crown corporations.
- *Cost of infrastructure.* Related to the previous point is the widespread concern about “stranded costs.” Electric utilities put capacity investments into place based on the public service model, many of which will not hold their value with competition. The size of the write-downs with competition is several orders of magnitude larger than those associated with gas restructuring.

#### **C. Legal**

- *Crown ownership.* The legal status of Canada's Crown corporations is tied to political uncertainties.

#### **D. Political**

- *Sovereignty.* This variable will largely affect the status of Crown corporations in Canada.
- *Nationalism.* Both Canada and the U.S. have been impacted by nationalist sentiments with regard to external energy trade.
- *Resistance of regulatory institutions to change (institutional lag).* This is especially important at the state and provincial levels.
- *Political mood relative to price and security of supply.* Ratepayers are also voters. Retail rates and reliability are sensitive issues for these customer segments in Canada and the U.S.

#### **E. Technology**

- *Link between changing technology and changing concepts about natural monopoly.* This linkage will be more strongly tested for electricity than for natural gas (or telecommunications).

**II. “Governance”** (Variability in systems of government, the nationalism/federalism dimension, across North America. This differentiates the NAFTA partners and has huge implications for publicness and timing.)

#### **A. Historical**

- *Management of Canada's Crown corporations.* Historically, responsibility for the Crown corporations has been with the provinces.
- *"Conscious parallelism."*<sup>156</sup> For some time, the NEB and FERC have been moving in tandem to facilitate competition and substitute market-based determinations for regulation. This has not been an overt strategy but rather an implicit move toward shared goals at the federal level.
- *Relative power of regulators.* Electricity restructuring comes at a time in Canada and the U.S. when the historically cyclical power of regulators is diminishing as a consequence of natural gas, telecommunications and other industry restructurings.
- *Role of the U.S. Congress.* Several initiatives have been proposed in the U.S. Congress for electricity that generally support the FERC's stance toward wholesale competition and would compel the states to follow with retail access.

#### **B. Economic**

- *Efficiency of hydro resources.* Canada's hydroelectric resources can be used to produce electricity at very low marginal cost. However, considerable up front investment is required. The economics of hydroelectric power may support the Crown corporation model.
- *Does the structure of public utilities (private vs. public ownership) impact efficiency?* Countering the first uncertainty is the difficulty of achieving a level of performance with public ownership that is comparable to what might be attained with private ownership and competition. The need to improve efficiency may outweigh the benefits of the Crown corporation model.

#### **C. Legal**

- *No key uncertainties were identified from the legal perspective on governance.* From a legal perspective, there is no difference between public or private control in shifting to market determination.

#### **D. Political**

- *Opposition of Crown corporations to open access.*
- *Greater convergence between provincial energy boards or tribunals and the NEB than between the PUCs and the FERC.* For a variety of reasons, one of which may simply be the fewer number of jurisdictions with regulator authority in Canada as compared to the U.S., there appears to be more agreement between federal and provincial commissions in Canada than between federal and state commissions in the U.S. Like the U.S., however, the differences across provincial governments and tribunals can be quite sharp.

#### **E. Technology**

- *Scale factors/technological advantages may lead to Crown ownership and consequently support the role of government in the provision of electricity.* This condition applies principally to hydroelectric resource development.
- *Changing "regulatory technology" to accommodate market-based determinations adds to the erosion of regulatory authority.* "Regulatory technology" consists of the methods and institutional rules and norms that commissions typically use. A substantial commonality in regulatory technology exists across jurisdictions in Canada and the U.S. The shift toward market-based determinations and the implications for regulatory power is an interesting and important development. It encompasses the increasing reliance on approaches like incentive ratemaking and reflects the rapid spread or "diffusion" of regulatory technologies across jurisdictions. Finally, these concepts cut across the historical, political and economic dimensions of our analysis.

**III. “Timing”** (The nature of restructuring and length of transition are crucial to understanding the future shape of the North American marketplace. Importantly, publicness is related to energy restructuring, the problem of getting around state monopolies, and thus to timing.)

**A. Historical**

- *The force for change in the electricity sector is derived from the price environment for gas.* During the 1970s, natural gas supplies were perceived to be inadequate to support gas as a reliable fuel source. Policies were enacted in the U.S. that restricted the use of natural gas for power generation. Utilities pursued alternatives like nuclear and coal. However, in response to supply constraints in the U.S., Canada initiated the natural gas export program that now delivers about 13 percent of U.S. supply. Decontrol of U.S. wellhead prices for natural gas spurred drilling in the U.S. As a result, gas supplies are plentiful. The result is that gas-fired power became an attractive alternative, providing much of the impetus for electricity restructuring as well as industry reorganization (gas and electric convergence and resultant merger, acquisition, joint venture and strategic alliance activity). The uncertainty we identify here is associated with the possibility of rising natural gas prices as demand increases or with any supply uncertainty and whether this would negatively impact the timing of electricity restructuring.
- *The producer/consumer dimension.* Both Canada and the U.S. have experienced cycles in consumer and producer sovereignty. The balance between consumer and producer interests impacts policy and timing.

**B. Economic**

- *Forces that act to increase or decrease price and supply.* This uncertainty overlaps with the historical dimension.
- *Fuel competition, particularly the economics of coal relative to gas.* Realignment of electric power assets in Canada and the U.S. will continue to hinge on relative prices of competing fuels for power generation, of which coal and gas (as well as “gas-on-gas” competition, which reflects costs to produce and transport gas from different basins) will continue to be most important. This uncertainty is part of the broader set of forces that affect prices and supplies of fuels and overlaps with the historical and political dimensions.

**C. Legal**

- *Court challenges to electricity restructuring.* This is an obvious uncertainty associated with timing and overlaps with the political dimension.

**D. Political**

- *Duration of any crisis that would constrain restructuring.* Related to the point above, energy supplies (both power generation capacity and fuel sources) in Canada and the U.S. are substantial and prices reflect our supply situation relative to the 1970s. However, a shortage and, even more importantly, the length of a shortage would delay or possibly derail electricity restructuring.
- *Hedging as a delay tactic.* Various interests operating in the political environment could affect the timing of restructuring by delaying implementation at various levels.
- *Issues associated with Canada’s Crown corporations.* The political difficulty associated with restructuring the Crown corporations could affect timing.
- *Role of small customers.* In particular, residential and small business ratepayers are important voting blocs. Any unhappiness among these customer groups could affect timing.

**E. Technology**

- *Mechanisms to facilitate open access.* Technologies must be developed and deployed to facilitate open access at all points in the system, generation (continued improvement in generation

efficiencies and costs), transmission (system integration and management and development of storage technologies), distribution and marketing (storage, metering, billing systems, new marketing opportunities and so on) and risk management (integration of demand information and trading). A breakdown in the system as open access is implemented (electric service reliability is an often cited concern; see above) could affect timing.

- *New materials for the transmission grid.* Of the potential hard and soft technologies on the horizon are superconducting materials for transmitting electricity. Deployment of these materials and the huge potential gains in line retention (“line loss” of electricity is upwards of 30 percent during transmission) would have a tremendous impact on restructuring and integration. Timing of development and deployment is, however, quite uncertain.

#### **IV. “Economic Development”** (Variability in the comparative economic development of the NAFTA partners. This dimension affects publicness, timing and governance.)

##### ***A. Historical***

- *The producer/consumer dimension.* To some extent, the Canada-U.S. relationship, one that involves two developed countries, bears some of the same tensions as classic producer/consumer relationships that involve developing and developed countries, respectively. While the U.S. depends heavily on Canadian exports of natural gas, and while Canadian exports of electricity have the potential to exert great influence on the U.S. market, at the same time the U.S. is Canada’s only true export market for these commodities. This interdependent relationship has affected trade and foreign policy in both countries relative to the other and occasionally results in conflict, the source of uncertainty here.

##### ***B. Economic***

- *Highly integrated national economies and a fluid border for general commerce, trade and sociocultural exchange.* Countering any uncertainties stemming from the economic development dimension for Canada and the U.S. is the overall integration of these two economies. This has generally contributed positively to the bilateral relationship for energy.

##### ***C. Legal***

- *No key uncertainties were identified from the legal perspective relative to the economic development dimension.*

##### ***D. Political***

- *Nationalism.* Continuing from the previous discussion, there is some uncertainty associated with continued political acceptance of increasing natural gas and electricity exports, Canada’s natural resource wealth and assets, to the U.S. During times of discord on this issue, the conflict takes on nationalist overtones.

##### ***E. Technology***

- *No key uncertainties were identified from the technology perspective relative to the economic development dimension.*

The preceding analysis demonstrates that a number of uncertainties exist with respect to Alternative Future 1. Examining the positions of key stakeholders can further delineate these uncertainties. The following table summarizes our evaluation. A “+” or “-” is used to indicate relative direction, positive or negative, of influence of each group of stakeholders in each country. We found relatively few points of difference between Canada and the U.S. in direction of influence, but several instances in which influence, while in the same direction, might be stronger in one country than the other.

Where this occurs, we use a “<” to signal less than or “>” to signal greater than, for Canada relative to the U.S. We also identified the key issues driving each group of stakeholders.

**Table 4. Evaluation of Stakeholders’ Interests**

	<b>CANADA</b>	<b>U.S.</b>	<b>ISSUES</b>
Industrial Customers	+	+	Industrial customers in the CUS are positive forces for electricity restructuring. They benefit most from technology change that allows decentralized power purchases. They are also driven by historical pricing practices that favor other customer groups.
Ratepayers	+>	+	As with natural gas, if the imperative for electricity restructuring grows customer choice in residential markets may occur more quickly in Canada because of the longer, more intense winter heating season.
Existing energy industries (gas and electric utilities)	->	-	Existing electric utilities are barriers to electricity restructuring, but more so in the case of Canada’s Crown corporations.
Potential new players (“energy entrepreneurs”)	+<	+	Energy entrepreneurs, companies that will drive the direction and pace of restructuring, can play a more effective role in the U.S.
Federal vs. state/provincial regulators, policy makers	-<	-	In the CUS, decentralization is both a strength and a weakness but Canada could reach consensus among federal and provincial officials more quickly than the U.S. may among federal and state officials.
Environmentalists	->	-	Strategies, focal issues (“the North”) and the level of conflict in Canada appear to be stronger negative influences. Many environmental groups in the U.S. view electricity restructuring to be a strike against policy-mandated alternative fuels and conservation programs long imposed on utilities. However, some groups see restructuring as essential for loosening the hold of public utilities that many view unfavorably (suggesting a possible positive direction of influence).

Table 4 merits further discussion.

- Industrial interests in both countries are striving to take advantage of power generation technologies that afford greater flexibility and cost advantages. This drive toward decentralized power creates an overall push for electricity restructuring among large users, the same force for change that led to open access for natural gas. Also like gas, industrial users have historically subsidized the cost of infrastructure and service for residential and small business customers. These subsidies have also been a strong incentive for industrial users to promote restructuring.
- Ratepayer interests in Canada and the U.S. are essentially the same – especially with regard to the costs of restructuring (cost of transition as well as the resolution of stranded costs associated with the decline in book value of assets that cannot compete in a restructured market). These issues are perhaps more sensitive in Canada and may require more political commitment for restructuring because of Canada’s colder winters.
- Existing gas and electric utilities vary in degree of support for restructuring and integration but, again, public ownership in Canada differentiates stakeholder interests.

- The entry of cogenerators, independent power producers and other energy entrepreneurs into the electric power industry in the U.S. in response to federal initiatives (the Public Utility Resource Policy Act of 1978, PURPA, and revisions and the Energy Policy Act of 1992, EPAct) has had a significant impact on the drive toward restructuring. It will be more difficult for these entrepreneurs to flourish in Canada with Crown ownership in place. Indeed, many U.S.-based energy entrepreneurs face barriers to entry in Canada because of the status of the Crown utilities.
- In both countries, there is a high degree of regulatory fragmentation. While federal authorities may be committed to electricity restructuring, and some provinces and states may follow (some have actually led federal reforms), others may lag behind.
- Finally, environmental interests in Canada are differentiated by the strength of ideological appeal: Canada, the “pristine North,” should be protected from development, especially when development is to support energy exports to the U.S.

### Alternative Future 2: Mexico Joins the CUS

In Alternative Future 2 Mexico is able to adapt and keep up with changes in the CUS leading to integration and a free flow of continental trade for both natural gas and electricity.

**The story:** Mexico engages in an extremely aggressive program to reform and modernize its energy sector, continuing with the initiatives begun with its new regulatory framework and, most difficult of all, constraining the market power of its national energy monopolies and instituting market based transactions and pricing everywhere in the system. Interconnections for gas and electricity are established or improved so that Mexico’s grids function effectively with the CUS. Energy managers have acquired and implemented technology and technical knowledge that allows them to strategically hedge against risk and volatility in gas and electricity markets. Mexico’s overall economy has improved to support development across all customer segments. Within our ten-year time frame, Mexico is well on its way with natural gas and electricity marketization and full integration with the CUS is well established.

While Alternative Future 2 is not impossible, at least with respect to more efficient utilization of continental grids, it is, in our assessment, highly improbable within the ten-year time frame we selected for analysis. Indeed, in building our second scenario we could not identify a reasonable time frame for Mexico’s full integration with the CUS system. This is an important realization, because for many studies on North American energy and evaluations of Mexico’s initiatives, and for the investment decisions that rest on these studies, timing is a crucial assumption.

With respect to key uncertainties for Alternative Future 2, we concluded the following.

- Technology is a constraint in every dimension. Lack of technological options and the time required to introduce and implement new technologies will prolong the existing arrangement. Mexico is simply not at a point, and it is unlikely to be so in our ten-year time frame, where it can engage in integrated free trade. A considerable transfer of knowledge with respect to policy and regulatory approaches has taken place, but implementation is key.
- Even with open access in place for the Pemex gas pipeline system or for new pipelines, the NAFTA is a problem. Mexico reserved enough rights so that it can “close” its border with respect to energy trade.

- Attitudes toward the national monopolies and natural resource endowments create untenable political constraints.

The key uncertainties in each of our four issue categories overlapped our historical, economic, legal, political and technology disciplinary perspectives.

### **I. “Publicness”**

- *State ownership of resources (the national patrimony) and national monopoly control of resource production.* Mexico’s constitutional and related regulatory law protection, particularly of Pemex, is complex and difficult to unwind. There is little political support for privatization of either Pemex or CFE (or Luz y Fuerza, Mexico City’s huge electricity distribution company). While there are many efforts to improve operating performance of Mexico’s national energy companies, and many positive results, leaving the monopolies in place creates constraints that are likely to ultimately bear negative consequences. In the case of natural gas, with Pemex as the single supplier for the vast majority of the country, and with the favorable economics associated with production in Mexico as compared to the U.S. and Canada, development of downstream markets will be difficult. For electricity, the CFE’s position as monopsony buyer will constrain private investment in Mexico’s electric power sector.

### **II. “Governance”**

- *Centralized control of investment and decisions relative to infrastructure and resources.* Although Mexico has taken major steps with establishment of the CRE and creation of a regulatory framework (although revisions to the electricity rules are needed), decisions on franchises and oversight remains at the federal level. This reduces flexibility and will slow the pace of development. “Political devolution” will ultimately increase tension between federal decision-makers and local interests.

### **III. “Timing”**

- *Pace of change is slow enough that opposing coalitions are able to restructure themselves.* Mexico’s energy sector, government and political regime type are all closely intertwined. Revenues from oil production have traditionally provided the major source of general funding for Mexico’s federal government. The fuzzy line between the federal government and Mexico’s major political party, the PRI, has created a direct link between Mexico’s political elites and petroleum sector. Strong political opposition exists to changing the status of Mexico’s national energy monopolies, and even to the changes most recently put into place. Because the pace of change is slow, these opposition coalitions may be able to restructure and survive even though Mexico’s political system is also undergoing historic reforms and faces increasing pressure to democratize.

### **IV. Economic Development**

- *Prevailing attitudes toward resource endowments and national monopolies.* The producer/consumer dimension identified as a key uncertainty for the CUS in Alternative Future 1 also applies to Mexico, but even more strongly.
- *Regime type and overall economic growth.* Mexico is burdened with many of the same constraints to economic development and growth that other developing countries face as a consequence of centralization and control. While market reforms continue to progress, there is still suspicion of market-based economic policies.

We identified several stakeholder issues that have complex positive and negative effects for Mexico.

- **Political elites** are much more important in Mexico than Canada and the U.S. with respect to energy. A shift among elites toward market determination is essential for Mexico to integrate with the CUS model. This is happening, but slowly, and is generational change for the most part. A barrier to both general economic and energy reform, however, is the extent to which these strategies are debated at the elite level.
- **Industrial customers** play much the same role as in Canada and the U.S. in driving energy sector restructuring. However, there are strong relationships among Mexico's largest industrial companies and the national energy monopolies which complicate analysis. Many industrial customers want better prices and service, but do not necessarily favor privatization of Mexico's national energy companies.
- The external **financial community** may be a force for change. Worldwide competition is keen for private capital for energy infrastructure. Mexico is becoming much more alert to the views among international financial markets. However, typical of emerging markets, there is considerable resistance within Mexico to the idea that international investors might influence or even control internal policies.
- **Elite influence from northern Mexico** may be an interesting variable. Northern states are best positioned to integrate with and benefit from the CUS system, creating pressure for reform.

The role that northern Mexico might play in building pressure for integration leads to an aspect of our scenario analysis that is more probable – the growth of an active border “free trade zone” for energy. Certainly, the most vigorously sought after project opportunities are in the northern tier and it is likely that northwestern Mexico (Baja California) will integrate fully with the CUS system before the rest of the country. This possibility has been identified in previous work<sup>157</sup> and is due largely to the lack of comparative advantages for Pemex in that region and the considerable relatively low cost supplies of natural gas and electricity available from California. For border electricity trade to take hold and flourish, however, the CFE will have to take a more favorable position toward wheeling.

## Risks to Our Scenario Outcomes

The risks to our scenario outcomes are evident in our analysis. They can be summarized as follows.

### Alternative Future 1: A CUS System for Electricity

Downside risks:

- Technological barriers associated with electricity restructuring in both countries are such that markets for power and CUS integration cannot be established within our time frame.
- Regulatory constraints and barriers, and the associated politics, are such that markets for power and CUS integration cannot be established within our time frame.
- Political disputes *within* Canada and the U.S. trigger a retrenchment in both natural gas and electricity marketization and integration.
- Political and/or trade disputes *between* Canada and the U.S. trigger a retrenchment in both natural gas and electricity marketization and integration.

Upside risks:

- Technological, regulatory, political or trade disputes are resolved (or do not emerge) such that electricity marketization and integration proceed unimpeded.
- Technological, regulatory, political or trade *breakthroughs* are achieved such that electricity marketization and integration proceed more rapidly than we have anticipated.

## Alternative Future 2: Mexico Joins the CUS

### Downside risks:

- Overall political and economic development in Mexico impedes or triggers a retrenchment against natural gas and electricity marketization and integration.
- Technological constraints impede marketization and integration.
- Marketization of gas and electricity takes hold, but trade disputes with the CUS impede integration.

### Upside risks:

- Technological, regulatory, political or trade disputes are resolved (or do not emerge) such that natural gas and electricity marketization in Mexico and integration with the CUS proceed unimpeded.
- Technological, regulatory, political or trade *breakthroughs* are achieved such that gas and electricity marketization and integration proceed more rapidly than we have anticipated.

## **PART IV. CONCLUSIONS – OVERCOMING BARRIERS TO CHANGE**

### **Barriers to Energy Integration in a Free Market Context**

Our scenario experiment revealed that, while a CUS electricity restructuring that parallels natural gas is plausible within the ten-year time frame for our analysis, many potential roadblocks exist and some could easily disrupt the process. The inclusion of Mexico into the CUS system is much more problematic, and the flaws in conventional thinking about the NAFTA and its role in encouraging significant energy reform in Mexico are deeply apparent.

The following general considerations were drawn from our scenario analysis and evaluations.

- Regardless of outcomes and time frames specifically with regard to Mexico's inclusion, possibilities for joint ventures with Pemex and/or CFE continue to exist. Many Canadian and U.S. firms are seeking these out as solutions to an otherwise difficult investment and operating environment. In addition, nothing in the NAFTA or other underlying conventions precludes joint ventures between Mexico's national energy companies and Mexico's industrial groups or other foreign investors. Nevertheless, successful joint venture programs could ease pressure to reform Mexico's national monopolies, especially with regard to the difficult political solutions to their constitutional status.
- Natural gas deliverability issues in Canada and environmental opposition directed toward exports could change entirely the picture for North American gas. A political constraint associated with Canada's role as energy supplier to the vast U.S. market, such as public opinion swaying against natural gas exports, or technical supply constraints in either Canada or the U.S. could alter Mexico's position. Such an opening conceivably might allow Pemex to build a vigorous export program for gas and could bring Mexico's interests much more in alliance with those of the CUS with respect to management of pipeline systems and, perhaps, upstream policies. Likewise, an opening for electricity wheeling in Mexico would create pressures for greater access throughout much of the North American grid.
- As we conclude this project, Mexico's general economic situation appears to have improved from the situation in 1995-1996 following the most recent peso devaluation. However, until fundamental reforms take hold, Mexico will continue to face fiscal pressures. Given the size of Mexico's energy sector, it is a logical place for policy reforms and therefore political conflict.

Many threats exist on the horizon, from volatility in world oil prices to fiscal pressures as Mexico approaches presidential elections in 2000, which could hamper progress. In our view, it is only a deeper commitment to economic liberalization and “marketization” that will allow Mexico to successfully navigate these challenges.

As noted early in Part III, one of the most useful aspects of scenario analysis lies in what is learned about the present. Our scenario analysis suggests much about potential barriers to continental marketization and integration of natural gas and electricity systems. In combination with our baseline assessment, we conclude that the following five conditions bear the most significant implications for North American natural gas and electricity integration as we have defined it in our study.

### ***Regulatory Harmony and Regulatory Technology Transfer***

The central focus for our study is the prospect for policy and regulatory harmonization across the North American natural gas and electricity landscape, and the implications of harmonization for seamless transactions. To fully address this question, we looked at many facets of these industries. Our simplest conclusion is that harmonization is essential. Indeed, the reader should detect a tautology, strongly present in our analysis – it is, and will remain, difficult for truly seamless transactions across jurisdictions continent-wide to take place *without* at least some policy and regulatory harmony. For the most part, our analysis leads us to be optimistic about the prospects for harmonization. There are important caveats, however, that reveal much about the future of North American gas and electricity.

Taking the problem of regulatory harmonization first, we can summarize our findings as follows.

- Both formal and informal processes occur that facilitate common regulatory approaches, much more so between Canadian and U.S. jurisdictions than between these countries and Mexico. There is no overt policy mechanism driving regulatory harmonization, nor do we suggest that there should be.
- Diffusion of regulatory technology appears to take place, at least in terms of awareness of new ideas. Implementation is subject to a complex array of forces, detailed in our baseline analysis in Part II and inherent in our issue categories of publicness, governance, timing and economic development. Again, diffusion seems much more apparent across Canadian and U.S. jurisdictions.
- Overall, therefore, harmonization is most clearly evidenced with respect to Canada and the U.S. As the natural gas sectors in these countries have become increasingly integrated, so do regulatory practices. Within each country, there is a vigorous exchange of ideas and close monitoring of experimentation, in spite of tensions inherent in our federalist systems of government. Between our two countries, an interesting process of “watching from afar,” or the “conscious parallelism” identified in our scenario analysis, leads Canadian and U.S. regulators to follow generally similar pathways. In large part this occurs because market forces have overwhelmed the regulatory process. To their credit, regulators have recognized and, for the most part, facilitated the marketization process. The process is most uneven among the Canadian provinces and American states. In addition, electricity restructuring is likely to be more contentious than for natural gas because the stakes are perceived to be higher. For some time, jurisdictions within Canada and the U.S. are likely to engage in experimentation as local and regional issues overwhelm the push for increased competition across both nations. With respect to Mexico, the level of infrastructure development relative to Canada and the U.S. constrains the application of market principles, although the CRE’s program attempts to introduce competition

to the fullest extent possible given the structure of Mexico's energy sector. The CRE interacts with regulators at all levels in Canada and the U.S. but the application of regulatory practices in Mexico also remains uniquely determined by the character of Mexico's energy sector.<sup>158</sup>

- The most striking difference across North American regulatory institutions lies in their connection to forms of governance in each country and what that implies both for the implementation of regulation domestically (and the politics therein) and the relation of regulatory institutions to each other. In Canada and the U.S., the highly decentralized federalist systems in both countries ensure that considerable regulatory authority resides with provincial and state regulatory agencies. Across all jurisdictions – provincial, state and federal – a strong tradition of regulatory independence is established both by law and the courts. Finally, the English-based common law systems in both countries extend legal rights found in civil arenas to regulatory processes as well (due process, the right to request and present evidence and so on). Mexico is quite the opposite. The highly centralized form of government provided for in Mexico's constitution extends to the regulatory commission which, in spite of its legal authority, appears to often fall under political pressure. The Mexican Roman law tradition does not facilitate multiple sources of hierarchical law making (constitution, legislatures, executive branch, and judiciary).

We noted from our scenario analysis that decentralized regulatory systems in Canada and the U.S. have both strengths and weaknesses. The strength of the system lies in its strong connection to democratic processes and decentralized investment decision making. The weakness lies in the political coalitions that evolve around local interests and that seem to work more against marketization than integration than in favor of these trends. In the case of natural gas and electricity, this is a particularly acute problem because of large synergies that exist across the value chains for these industries and that can work to the advantage of both producers and consumers. Based on our own research and previous work<sup>159</sup>, however, it appears that too many levels of regulatory jurisdiction may exist in Canada and the U.S., but to a greater extent in the U.S. Municipal as well as provincial or state jurisdictions along with the federal commissions all may have a say in regulatory design, competition, pricing, access and so on. In contrast, Mexico's system facilitates too little local input. We suggest that a balance may need to be struck.

With respect to policy harmonization, the differences across the NAFTA countries are more pronounced.

- Although federal-level policy initiatives can still affect, or be sought by, energy interests in Canada and the U.S., for the most part NRCan and the U.S. DOE do not play specific policy roles. They have, however, provided significant policy and political support for market-based solutions to natural gas and electricity.<sup>160</sup> The federal-level agencies also encourage regulatory harmonization, among both national agencies (NEB and FERC) and among the respective provinces and states. However, for the U.S. DOE in particular, external and internal politics seem to prevent these agencies from playing more effective roles in their domestic markets and both internal and external politics affect any role NRCan or U.S. DOE might effectively play internationally. Both NRCan and the U.S. DOE are increasingly constrained by their budgets from more active involvement, a natural consequence of the growing importance of markets. Similar problems exist for Mexico's SE. Reorganized from a ministry that included energy as well as non-fuel mining, SE remains a relatively ineffective force largely because of the weak power traditionally held by the Secretary. Budget issues also abound for the ministry. A more perplexing, and intractable, problem is that the Secretary serves as chairman of the board for both of Mexico's major, national energy companies, Pemex and the CFE. In time, this reduces the ability of SE to be a strong force for reform.

Finally, for both policy makers and regulators, attention to value chain development remains uneven across North America. This a consequence of several factors: lack of technical knowledge, a tendency to focus on narrow sets of issues especially in the demanding regulatory arena, pressures from the pace of change and adjustment in the natural gas and electricity industries and the numerous operating impediments that regulatory institutions have always faced (attracting talented staff and providing adequate compensation, consistent leadership, better opportunities in the private sector, and so on).

In sum, while there is much good news from our data collection and scenario analysis for the current state of regulatory harmonization and how trends might unfold, there is also much to be done in order to maximize the our North American natural gas and electricity assets.

### ***Regionalization***

Our baseline analysis in Part II pointed to the role of regionalization, but our scenario outcomes highlight the consequences of regionalization for continental marketization and integration. There is both good news and bad news.

- The prospect of continental integration as a result of interconnected regional markets is very real and already a fact of life. This is true across national borders as well as for subnational boundaries. Indeed, as regionalization expands opportunities for value maximization across the natural gas and electricity systems for both producers and consumers, the increasing density of regional interconnections and market systems will continue to offer new alternatives beyond the initial design.
- The downside of regionalization comes in the form of “local politics” surrounding local natural gas and electricity distribution. It is hard to predict the pathway by which provincial and state regulatory frameworks evolve into a more even landscape, with the adoption of common rules and practices that can lead to large-scale benefits. Indeed, a ten-year horizon for CUS electricity restructuring (and for the remaining adjustments in the natural gas system, as described in the Appendix, to be resolved) may be heroic. In addition, it may be that federal level policy initiatives will be required in order to encourage a “smoothing out” of provincial and state approaches (though that would entail considerable political conflict and cost).
- Where regionalization may play the most interesting role is in the positive benefits that could be achieved along the U.S.-Mexico border (refer to our recommendations, below).

### ***International Trade***

At the outset of our study, we laid out three elements of conventional wisdom associated with the NAFTA. The NAFTA may have been one of the most anticipated of the existing regional trade regimes outside of the European Union. A great deal of speculation continues to be directed toward the linking of Mexico to the much more developed economic and legal/institutional systems of its northern neighbor. And a great deal of ambivalence continues to characterize the Canada-U.S. relationship. Pursuant to each of these three statements, we conclude the following based on our baseline assessment and scenario analysis.

1. “Canada and the U.S. maintain the most seamless border in the world; there are no real issues for Canada/U.S. integration.”

It is mostly true that the Canada-U.S. border is extraordinarily seamless. However, a variety of tensions exist between the two countries that have historically created difficult circumstances for economic trade and are likely to flare up again, to some degree. Potential trouble spots for natural gas are export growth from Alberta into the U.S. west, and from eastern Canada's new oil and gas producing areas, Hibernia and Sable Island (refer to the Appendix). Offsetting production declines in the Lower 48 of the U.S. are the likely result should both of these export programs prove sustainable, and disputes related to transportation costs are possible. More troublesome will be exports of electricity from Canada's Crown corporations because of their implications for gas-to-electricity value chain maximization in the U.S. and restructuring in Canada (since interprovincial trade may be equally controversial). While most of the institutional impediments to seamless natural gas trade between Canada and the U.S. have been reduced or removed (refer back to Table 2. Natural Gas Export/Import Criteria), new sources of conflict could easily emerge, reinforced by political considerations and differing political cultures between the two countries.

2. "In general, the NAFTA will lead to a balanced commercial trade regime despite differing levels of development among the countries because the new regime will help to 'bring Mexico along.'"

Since the signing and implementation of NAFTA, the situation in Mexico has become more volatile and unpredictable rather than less. Overall, the NAFTA does appear to set reasonable ground rules for continued restructuring and increased efficiencies in Mexico's economic sectors, including energy to some degree. What was not given adequate appraisal, perhaps, was the depth of the political upheaval that would accompany the taking apart of Mexico's six-decade old dependency by its political system on national economic assets, especially in the energy sector. Adequate legal and institutional structures to replace the stable, albeit corrupting, existing ones will take time to evolve. Essentially, the situation in Mexico replicates the experience in other world regions, notably the Commonwealth of Independent States (CIS) and their struggle in the post-Soviet world to create, simultaneously, new economic and political orders. The creation of Pemex was, for Mexico, as important to the building of the Republic as the national oil companies in many of the CIS countries appear to be in those situations. In the NAFTA experiment for Mexico, it appears that emergence of the new trade regime is not a sufficient basis for the evolution of a market based economy that can join Canada and the U.S. as a full partner. Democratic institutions are needed that can facilitate both the operation of market mechanisms as well as the orderly transfer of political power.

3. "Even though energy was not a significant component of the NAFTA, market reforms elsewhere in Mexico's system will create pressure for significant restructuring of Mexico's energy sector."

This last condition constituted one of the most powerful arguments for support of the NAFTA by Canadian and U.S. energy interests, but was the most tenuous of the three assumptions. Many of Mexico's initiatives for energy were being debated or in the early stages of action well before the NAFTA was finalized. True, the NAFTA reinforced these nascent efforts. However, the new trade regime simply does not provide enough support for the truly tough steps that must be taken *if* Mexico's goal is to have a market-based energy sector (and there is some doubt as to the nature of Mexico's goals in this regard).

### ***Investment, Ownership and Anti-Trust Controls***

We recognized throughout our analysis that the status of Mexico's national energy companies was problematic and not easily dealt with. We faced this dilemma with many other facets of the North American energy scene, such as Canada's Crown corporations, the U.S. power authorities and the investor-owned utilities in both countries. Our analysis demonstrates, as others have, that it may be,

probably will be, equally hard to foster competitive markets in portions of the Canadian and U.S. natural gas and electricity sectors as to alter the fundamental design of Mexico's energy sector. The important point for Canadian and U.S. interests is to recognize this situation, and deal with Mexico's situation in fair terms.

The difference between Canada and the U.S. and their southern partner, however, is that in the CUS the pendulum is swinging in favor of greater balance between consumer and producer interests, driven by consumer expectations that are able to be expressed freely in the political marketplace. Our evaluation of stakeholders' interests fully demonstrates the gap between the CUS and Mexico in this regard. The evolution of the North American energy marketplace and the timing of that evolution hinge on the extent to which each of the partners and their subnational jurisdictions are willing to institute, and enforce, the rules and norms that facilitate decentralized investment and ownership of assets. It is truly a paradox that government intervention, long the bane of business interests, is also required to some extent to provide the legal/institutional frameworks that allow businesses and their consumers to interact freely. Given that this paradox must exist, then it is clear that some steps need to be taken to ensure that the marketplace is consistently, though preferably light-handedly, enforced.

### ***Politics and Economic Development***

Finally, the most difficult aspect of our study was to acknowledge, and deal with in equitable terms, the differing levels of political and economic development across North America. The relative positions of the three countries with respect to economic development and maturity of their energy sectors are clearly linked. While Mexico may encompass a greater proportion of economic dislocation, neither Canada nor the U.S. are absent of the encumbrances that can prevent producers and consumers from achieving the full benefits of their resources.<sup>161</sup> The national companies in Mexico, the power authorities in the U.S., the Crown corporations in Canada and the investor owned, regulated monopoly utility services in Canada and the U.S., share a common feature. In exchange for the ability to operate profitably in protected industries, they carried the burden of universal service (what we term the "regulatory compact" for U.S. utilities and refer to as the "universal service compact"). This may have served each of the NAFTA partners well in the early nation-building stages, but the questions are how well they can serve our countries as we move forward and what is the best strategy for transitioning to some other arrangement. Unfortunately, there is no easy process during times of transition and no way to guarantee that mistakes will be made, some of which will mimic mistakes made in the past no matter how concerted the effort to prevent history from repeating itself.

As we collected data and information, we were encouraged by the number of instances in which market solutions are being sought to replace what might be lost if the old, universal service regulatory compact is dissolved. These include gas purchasing associations formed by small LDCs to increase their market power and options, pilot marketing programs to aggregate low income and remote customers, more competitive arrangements for electricity cooperatives and the evolving possibilities for distributed generation or "distributed utilities" which may facilitate the development of small scale facilities and cogeneration from a wider array of sources as well as the myriad of innovative products and services that facilitate real time management of energy needs for both commercial and residential applications. To us, this signifies that other solutions are available and that economic determination may do more to stimulate economic and political development in North America, even in our poorest neighborhoods, than we could continue to achieve from our existing arrangements.

## **Evidence of Barriers (and Break-Throughs) Since Completion of Our Research**

We stated at the outset of our scenario analysis that a flaw in the use of scenario analysis is the tendency to look for “confirming evidence.” However, much has happened since we conducted our experiment. In the spirit of our study, we actively sought out both conflicting and confirming evidence in order to evaluate our methodology and conclusions. Our sources included the major industry trade publications, other news media accounts, filings with regulatory bodies and information provided by our network of participants in this study. Additional details can be found in the Appendix.

### ***The CUS Model***

- With regard to natural gas, cross-border arrangements continue to expand. We noted above that new projects would bring additional volumes of natural gas into the eastern U.S. from the Canadian Maritimes and into the western U.S. from western Alberta. Isolated pockets of concern within the U.S. producer community affected by increased Canadian exports, coupled with parallel situations on the consumer side in Canada with regard to disposition of Canada’s resources, could at some point prove conflictual. However, it is clear that the drive to expand exports and integration in Canada, particularly in Alberta, is a function of the desire among Canadian producers to achieve natural gas prices more at parity with those in the U.S. Pipeline bottlenecks have constrained prices in Alberta to U.S.\$1.00 or more less than Henry Hub (the location for the most widely traded natural gas futures contract in North America). Indeed, a producer association is undertaking one of the pipeline projects, Alliance. We may not have adequately considered the role of Canadian gas producers in our baseline assessment and scenario analysis. As we went to press with this report, Canadian gas producers and pipeline companies had signed an accord committing all parties to support competition and greater customer choice; to encourage increased pipeline capacity from Canada’s Western Sedimentary Basin; and to support regulatory frameworks that foster competition among both existing and new pipelines.<sup>162</sup> These strategies suggest intriguing implications for electricity restructuring in the CUS and Mexico’s eventual role in North America (see below).
- Overall, electricity restructuring in the CUS is proceeding, albeit slowly and unevenly. During the past months we have observed incidence of both incentives and constraints identified in our baseline assessment and scenario analysis, especially with regard to stakeholder interests in both countries. At the time we initiated our study, the Canadian province of Alberta had begun the process of unbundling generation, transmission and distribution accounts. An independent system operator manages transmission by the “gridco,” an offshoot of the existing integrated utilities, which remain intact. Unregulated “gencos” are able to place power into the pool with transparent pricing. However, access to the power pool by purchasers is limited to the distribution companies or “discos.” Expectations were that, eventually, large power users would be able to enter the pool for competitive bulk purchases and that in the coming years retail wheeling would be allowed. A weakness in the underlying restructuring law is that, given the strategy at hand, new generators would not have an incentive to enter the Alberta market, especially since the existing integrated companies would simply add capacity through their own subsidiaries. Interestingly, Alberta’s actions appear not to be electricity-price driven, since the province had some of the lowest electricity prices in the nation. Rather, restructuring seems to be ideologically driven, consistent with political and socioeconomic trends in the province. In addition to low electricity prices, stranded costs associated with restructuring in Alberta are

considerably lower than in Ontario and Quebec, the provinces in which restructuring is likely to be most contentious.

- The path to electricity restructuring in Ontario and Quebec appears to be as difficult as our analysis suggested. In contrast to the MacDonald Commission report (see Appendix), a more conservative approach toward Ontario Hydro restructuring has been put into place. The giant company will be disassembled into three utilities, all of which will remain provincial crown corporations – a generation company that will run all of Ontario Hydro’s facilities, a transmission company that will operate the grid and a retail company.<sup>163</sup> The desire of the provincial government is to encourage competition in electricity services, but this will be difficult given the presence of the Crown genco. Coincidentally with development of the restructuring plan, and paradoxically, Ontario Hydro began to seek relief from electricity export agreements for which it would have to rely on heavily polluting coal- and oil-fired plants.<sup>164</sup> As these plants are phased out, so will the excess generation capacity that existed at the time export contracts were signed.
- An issue within Canada and the U.S., as well as between Canada and the U.S. where it takes on overtones of sovereignty and national interest, is “reciprocity,” equal access to pipeline or electricity grids and customers once systems are unbundled. Tensions are strongest where stranded costs are highest, because the tendency to protect markets in those situations will be most tenacious. Reciprocity was an issue between Canada and the U.S. when the CFTA was negotiated as well as with the NAFTA. In the early stages of our study, it was pointed out to us that reciprocity issues especially at the international level are largely beyond the scope of regulatory bodies, representing something of a vacuum in the ability of regulators to truly act as “market facilitators.”<sup>165</sup> These same issues apply to Mexico. Reciprocity will grow in importance as an issue as the number of filings for electricity wheeling increase. (Several interesting filings have already been submitted for wheeling between Canada and the U.S. and the U.S. and Mexico, and in the latter case Mexico has argued specifically that it is not subject FERC rules for open access.)
- Generally, we have observed many of the same difficulties in U.S. electricity restructuring as are evident in Canada. The Appendix provides a brief recap of the status of debate and implementation across Canada and the U.S. Where stranded costs are highest, the debate is, not surprisingly, sharpest. Across the U.S. states, motivations for restructuring vary widely across stakeholders, suggesting that the process will unfold in very distinct ways according to the allocation of costs and benefits across stakeholders in each instance. Those states with most to gain in savings to consumers have been more open to restructuring experiments. States where electricity prices are already relatively low have been slowest to react (like Alberta, California with its aggressive plan often is considered to be a place where motivations for restructuring are not purely economic). Publicity surrounding the software problems for California’s system operator appears to have had a dampening affect nationwide. Ice storms in the Northeastern U.S. this winter and the still unresolved, abysmal system failures in Auckland, New Zealand (a closely monitored country for its aggressive approach to electricity restructuring) have contributed to a general sense of heightened caution at this time. But another factor is that, except in those cases where electric utilities have performed most poorly (usually involving controversial nuclear facilities), the existing institutional arrangement of regulated monopoly has worked reasonably well for the bulk of consumers. Thus, particularly in the U.S., it appears that demonstration of consumer benefits will be fundamental as restructuring moves forward. Of more interest will be any role that might be played at the national level in an attempt to smooth out the process. Existing proposals in Congress deal largely with solutions for allocating stranded costs and guaranteeing fair access. It has not been lost on most observers that a great deal of political and policy inconsistency exists in any national push to move electricity utility restructuring forward while most gas utilities still operate without broad unbundling options for customers (except for the largest users, who continue to move away from LDC systems). In many states where the

restructuring debate looks to be prolonged, investor owned utilities have been able to restructure their relationships with existing customers and so create additional barriers to entry to new entrants (a logical and rational strategy). An interesting situation exists with the federal power authorities which, like Canada's crown corporations and the largest, most vulnerable IOUs in both countries, stand to lose much from the declining book value of their assets if competition is allowed to penetrate the federal power system. Communities within FPA service areas must use legal means in order to achieve access to alternative suppliers and at least two court cases have been filed with this goal.<sup>166</sup> Finally, as we initiated our work, a trend toward "municipalization" emerged but seems to have diminished since then. Municipalization is the taking over of distribution assets by municipal governments that then enter the bulk power market on behalf of their customers. This option was especially prominent in California as smaller communities in particular sought solutions in the restructuring marketplace other than what they perceived the IOU to provide.

### *The Mexico Model*

- We expected, as all astute observers of the North American scene should, that the most difficult pathway to assess is Mexico's integration into the CUS system. Evidence confirming constraints to marketization and integration appears to far outweigh positive indicators. *But*, the positive indicators that exist suggest intriguing windows of opportunity that, if encouraged and exploited, could bode well for energy reform and development in Mexico.
- On the plus side, several distribution franchises have been auctioned to a variety of consortia and joint ventures that bring together both Mexican companies as well as foreign interests. In its rules, the CRE emphasizes the cost of delivered gas in order to increase the chance that LDCs will be managed by low cost, efficient operators. Over the course of bids initiated and completed to date, there has been a general decline in proposed costs and increasing tightness among competing bids (reflecting greater knowledge about the bid process among participating companies). However, the opportunities to "buy into" the Mexican market in order to be better positioned for more lucrative opportunities that are believed to exist is very high. This means that bids may be low because costs are spread over very aggressive load forecasts. Disputes have arisen over the awards of at least two of the auctioned franchises. Given that the CRE imposes strong investment and performance standards that must be met within fairly aggressive timeframes, there is the possibility that some systems could fall into default if predicted load forecasts do not materialize.
- We have mentioned elsewhere in this report, including the previous section on the CUS model, that enhanced integration of Pemex into the North American grid could lead to deeper reforms in Mexico. Like producers in Alberta, Pemex managers are well aware of the value of their natural gas in healthy North American markets. The revenue incentive to achieve greater integration with the pipeline grid is strong; during winter 1995-96, Pemex made many attempts to sell gas into the U.S. heating market but was not able to do so because of pipeline bottlenecks in south Texas.<sup>167</sup> Many have argued that Pemex will not be able to satisfy domestic demand should all proposed and potential gas projects, including new petrochemicals facilities, be developed. This may be true,<sup>168</sup> and there will always be opportunities for some cross-border arbitrage, but it appears that a confluence of many events will be required for any scenario of sustained, large net exports of natural gas to Mexico to hold up. It is more likely, based on our analysis, that new gas projects will proceed slowly enough so that Pemex has time to make the upstream investments needed to keep pace with growing demand. Also, substantial imports of gas would represent a flow of hard currency out of Mexico, a situation the country can ill-afford. Because the preponderance of natural gas in Pemex's current portfolio is associated with crude oil, it is

unlikely that in light of Mexico's export-revenue needs crude oil production would drop through any intended action by Pemex's management. Which raises another omission in our scenario analysis – underlying assumptions about world oil prices and the implications for North American integration. We embarked on this study at a time when world oil markets were firm. As we publish our results, economic collapse in Asia, cheating on production quotas by OPEC members and increased oil production by non-OPEC countries, including Mexico, have combined to shove oil markets back into the reality of a sustained low price environment. Many producer countries in addition to Mexico, most notably those of the Former Soviet Union, are dependent upon growing oil exports for revenue to support economic development and political stability. During the price collapses of 1982 and 1986-1987, Mexico, counter to trends among other leading producers, attempted to maintain oil production volumes. The resulting loss of wealth drew heavy criticism and contributed to a peso devaluation but, in truth, there are few options for oil export revenue-dependent economies.

- For Mexico's natural gas marketization to succeed as it is designed, two conditions must be met – third party, nondiscriminatory access to Pemex's national pipeline grid and growth in demand for natural gas in Mexico. At this time, open access has been achieved only in one small, isolated portion of Pemex's system (Naco to Hermosillo, which provides gas almost entirely to mining operations in the region but which operates at very low capacities). A decision on a plan to provide open access was to have been achieved by the end of last year, but appears to be delayed indefinitely as disputes over title to certain of Pemex's assets cloud negotiations. Various plans have been devised to place disputed assets into trusts managed by Pemex until other solutions can be found. These strategies may work to inhibit competition. It has become clear that Pemex views its natural gas businesses, which account for roughly 40 percent of the company's revenue, to be much more valuable than only a few years ago when natural gas was regarded to be merely a byproduct of Pemex's lucrative oil business. Strategies at Pemex that result in the company being more competitive can ultimately benefit Mexican consumers. Nevertheless, Pemex, operating as a more efficient, effective, customer-oriented national monopoly, controlling both natural gas supply and transportation, is a substantial barrier to entry in Mexico's natural gas sector save for those firms that devise successful working relationships and partnerships with Pemex subsidiaries.
- The second requirement, growth in demand for natural gas, is much more difficult to ensure. It is widely accepted that, over the long-term, economic development in Mexico coupled with environmental protections will make natural gas an attractive fuel. The dilemma lies, again, in the pathway to that future. Long-awaited environmental rules that would restrict the use of high sulfur fuel oil in Mexico's power generation facilities were due to come into effect in 1998. These look to be delayed, also indefinitely. Downstream investments by Pemex that would reduce the amount of resid the company needs to place in the domestic market have not been keeping pace. This was not unexpected.<sup>169</sup> It is, at the current time, exacerbated by softness in world oil prices (constraining revenues for reinvestment in Pemex's capital projects) and the economic situation in Asia (Japanese and South Korean firms are involved in several downstream projects, including financing). Independent, gas-fired power generation projects might take up the slack so long as needed revisions to the regulatory framework for these facilities are made (specifically for gas supply contracting with Pemex and the price to be paid by the CFE for power purchases from IPPs). Separate, complex issues involving the CFE and questions of electricity sector restructuring also impact on IPP investments. Finally, Pemex's gas liquids (LPG) businesses are also lucrative, and conversion to natural gas would remove a substantial domestic market.<sup>170</sup>
- Resolution of whether or how to restructure the CFE will have a tremendous effect on the development of natural gas markets. Much lip service has been paid to wheeling electricity into Mexico, but considerable resistance exists to the idea of depending upon power generated outside

of Mexico.<sup>171</sup> A closely watched case, Enron's application to the FERC to wheel power into Mexico through the El Paso Power & Light grid, was found in Enron's favor as our report went to press.<sup>172</sup> This will place pressure on the CFE and SE to support in actuality SE's public commitment to electricity trade as a solution to Mexico's capacity constraints.<sup>173</sup> Wheeling power into Mexico could solve many of Mexico's power needs in the upcoming decade, especially in the rapidly growing and more market-oriented northern tier. It would provide a relatively low cost option to extensive investments in generation capacity – a serious dilemma from the point-of-view of new natural gas investors. Another aspect of CFE restructuring would be information gleaned from a review of Mexico's electricity system that identified system inefficiencies, led to modernization including economic dispatch and, in particular, reduced nontechnical losses (due largely to theft or nonpayment). During our baseline research, we learned that electricity subsidies comprise roughly half of the budget of Mexico's sector. In our view, this is an untenable situation under any circumstance. We suspect that with efficiency improvements Mexico's projected generation capacity needs might fall significantly. Whether the CFE remains intact as the national electricity organization or is broken up into separate regional utilities (an option long discussed in Mexico) could also have sharp implications, both positive and negative, for Mexico's energy and economic development path.

## **Recommendations – Paths Around Key Barriers**

Our analysis and results suggest several recommendations that could enhance the prospects for more market oriented and integrated North American natural gas and electricity systems that can support economic development and prosperity on the continent. Some of our recommendations are controversial, but we offer them in the spirit of our overall contribution and encourage debate and the exchange of ideas.

- Alter the status of Mexico's Secretary of Energy.

As we publish this report, Mexico has in place the third Secretary of the current Zedillo Administration. Any individual holding this position in these times is subject to enormous pressures and political conflicts, most of which are unresolvable in the current climate. Nearly from the moment of appointment, however, the Secretary becomes compromised by his duties as chairman of Mexico's national energy companies. This renders SE ineffective as an agency and removes neutrality from policy making. We recommend that the status of Secretary be altered to remove these responsibilities and to create a more effective, neutral office.

- Work to attain consistency in goals and objectives for energy policy and regulation.

The net benefits that may stem from harmonization of energy policies and regulatory frameworks cannot fully be achieved, even through informal channels, unless there is consistency in approaches within individual jurisdictions. This is difficult to attain because it requires resolution to fundamental differences of opinion within the three NAFTA countries, and their sub-jurisdictions, regarding reliance on markets and the role of government. At any point in time, commitment to either philosophy will be influenced by economic, political and social conditions outside of the control of policy makers, regulators, firms or consumers, and long-term patterns can revert or become cyclical. National policy institutions can play a role in educating consumers and lawmakers on the range of alternatives and encouraging balanced debate on all sides of these issues. The counterweight is that national energy policy institutions have a tendency to become too politicized to be effective, so that viable options should be created or supported.

Policy and regulatory consistency seem to have been weakest in Mexico. We suggest that a hard look be taken at the ultimate goals and objectives for energy sector reform. We cannot realistically recommend privatizing Pemex or the CFE. The political and social status of these companies makes such a suggestion meaningless, although a wealth of evidence suggests that private activity in Mexico's energy sector would yield many more benefits than can be achieved if the core businesses remain reserved for Pemex and the CFE. However, it seems to us that exposing investors to a situation in which market strategies are constrained by the presence of national energy monopolies does not accomplish much either. It may be that the only achievements are diminished revenues for the national companies and underperforming private investments because of the efforts by the national companies to retain control of their best customers. If the status of the national energy companies is something that will be preserved, then Mexico's policy and investment communities and their partners in the U.S. and Canada should be pragmatic about what can best be accomplished and strive for effective solutions.

Canada and the U.S. are not free of policy and regulatory inconsistency. The Crown corporations in Canada and the federal power authorities in the U.S. pose conflicts similar to those in Mexico. The savings and enhanced flexibility for customers achieved with greater competition must be weighed against the inevitable downward pressure on revenues as entrepreneurs chip away at markets formerly reserved for these government enterprises.<sup>174</sup>

- Overcoming NAFTA deficiencies.

Many researchers by now have pointed to the many deficiencies in the NAFTA with respect to energy and the difficulties that these deficiencies lend to the new regime. In our view, the deficiencies within NAFTA lie not with specific terms for energy trade but with the failure to provide broad principles for continental energy marketization and integration. Opening NAFTA to re-negotiation on principles would likely yield little return since the relative positions of the three partners with respect to energy have not changed much, if any, and it was the failure to achieve agreement on principles for energy that nearly stalemated the negotiations. It also appears that attempts to re-negotiate specific terms, for example accelerated phase out of tariffs on gas imported by Mexico, have little chance of success. At the same time, sharp disputes related to energy matters could jeopardize other aspects of the new NAFTA regime. We recommend, therefore, that the NAFTA not be opened for re-negotiation, since the overall benefits would likely not exceed the costs of doing so, but that during the normal course of review and renewal efforts be made to build dialogue on principles for energy marketization and integration. In light of our previous recommendations regarding consistency in approaches, however, it is clear that much work has to be done before a fruitful exchange can take place.

- Emphasize regional solutions.

We concluded that regionalization offered some good news, and that was in the development of energy market regions that interconnect into continent-wide systems. To the extent that regional solutions can be encouraged, then the outlook for national or continental ones becomes more positive. For Mexico in particular, this approach may be a constructive way of circumventing barriers to marketization and integration. We also noted earlier that the U.S.-Mexico border has been termed a place for experimentation.<sup>175</sup> Based on separate work undertaken by the Energy Institute, we recommend that pilot projects be undertaken to establish whether co-operatives and development bonds may provide useful tools for energy infrastructure development. An assortment of legal/institutional changes would be required, but all are achievable.

5. Constitutional provisions to allow decentralized financing in Mexico would be necessary. This is one of the biggest hurdles to a border region approach, but eventually decentralization must be achieved if Mexican businesses and communities are to flourish.

6. Regulations enabling the formation of co-operatives (Mexico's 1993 regulations allowing private investment in electric power generation) should be strengthened and clarified and terms and conditions for the creation and performance of co-operatives established. Other countries, notably the U.S., have facilitated the development of co-operatives. The U.S. used the rural co-operative system effectively to electrify remote towns and farms. Insured low interest loans would allow for infrastructure improvements in areas that are far from the Pemex and CFE, or U.S., systems.
7. Municipal utility districts, heavily used in Texas to provide services for new residential areas and industries, could be adapted for the purpose of providing energy services. Strict rules and codes of conduct and enforcement would be essential in order to ensure that MUDs operated profitably without opportunities for fraud.
8. Mexico should create a municipal bond market that would allow municipal jurisdictions some self-determination in funding infrastructure improvements, including municipal energy systems. This step will take time as all of the institutions that facilitate "muni" markets in other countries would have to be created in Mexico – bond underwriters, rating agencies, insurers, primary and secondary markets for trading, income tax provisions for interest free income to make munis attractive investments, and so on. Again, skills and experience from Canada and the U.S. could be easily shared with Mexico to build these institutional assets.

Any or all of these options could be experimented with among any of the rapidly growing cities and towns along the U.S.-Mexico border, borrowing heavily from Canadian and U.S. expertise and with a careful look at how other emerging markets (like India, the Philippines and Colombia) have deployed these strategies, successfully or not. These options would ease pressure on Mexico's national companies and hasten development. We suggest that a ready source of lending exists with the North American Development Bank (NADBank). The NADBank has come under criticism for a low level of activity since its creation with the NAFTA. We recommend that the charter of the NADBank be revised to allow lending for pilot energy infrastructure projects within the U.S.-Mexico border region consistent with the Bank's mission to encourage environmentally sound infrastructure improvements.

- Regulatory/policy gap on reciprocity.

We mentioned earlier the problems with reciprocity. Structures already exist for constructive dialogue on these issues (bilateral meetings between the national energy agencies, the NARUC and CAMPUT associations, and so on). We suggest that working groups within these structures be formed to evaluate the seriousness of reciprocity issues and workable dispute mechanisms before they become impediments to energy trade and integration.

- Regulatory restructuring

We have recognized in this report that the regulatory arena has not been immune to the forces of change that have impacted the natural gas and electricity industries. Not only are regulators and companies experimenting with more innovative approaches (market-based rates for transportation, incentive ratemaking, proactive technical conferences, etc.). Many regulatory bodies are also attempting to streamline their own operations, hear cases more judiciously, enable more efficient processes. These steps need to continue, but our survey of the North American energy situation suggests other necessary steps to be taken.

4. All regulators operate within the narrow confines of the case and decision at hand. We recommend that regulatory agencies need to reorganize staffs and processes so that they can be more "value chain" oriented, understanding the extent to which decisions in one portion of the gas and electricity businesses can impact supplier and consumer transactions in many other segments of these increasingly convergent industries.

5. We acknowledged that the federalist systems in Canada and the U.S. have both positive and negative ramifications for gas and electricity integration. Many levels and layers of regulatory control exist, particularly in the U.S. We recommend that a deeper regulatory restructuring should take place, perhaps even to rationalize institutions, like the public utility commissions, that in some cases have existed for about 100 years. In our view, with regional market development and the existence of regional reliability councils that entail Canadian and U.S. involvement, reorganization upward to regional-level institutions should be seriously evaluated to gain “political economies of scale.”<sup>176</sup> We recommend that laws and regulatory approaches devised during the infancy of the gas and electricity industries be thoroughly reviewed and revised or repealed accordingly based on the current, high technology, high value-added and increasingly competitive nature of these industries.
  6. In contrast to (2), Mexico should decentralize its regulatory apparatus or at least provide real outlets for sustained and meaningful input from state and municipal governments. An unwarranted risk is posed to investors should Mexico’s political devolution extend to a desire for local control over energy infrastructure projects when a greater effort could be made to accommodate local viewpoints and preferences.
- Education and technology exchange.

It is to the benefit of all stakeholders within the North American gas and electricity marketplace to be as well informed as possible of all options. Markets cannot function properly unless information is accessible. We suggested earlier that national energy policy bodies might have a role to play in this regard. Regulators as market facilitators play a role in reducing information asymmetries (recognizing, however, that information represents competitive advantage). Since the beginning of the deregulation movement in the U.S. in the 1960s and parallel trends in Canada, consumers in both countries have become much more astute with regard to what the market can offer them. Consumers in Mexico do not have this privilege unless they have had opportunities to travel or work outside of Mexico. In addition, Mexico’s elite, paternalistic institutions have stifled consumer preferences. Consumer education can be an effective agent of change and once consumers detect that choices exist it is difficult to return to the status quo. Our analysis suggests that this will be true throughout North America, but with variations in timing given where the starting points for the respective NAFTA partners. Our study also highlights the importance of technology to properly functioning natural gas and electricity markets in North America, and the barriers to Mexico’s full integration posed by technology deficiencies in that country. We also learned the limits to what private firms will share if they do not have profit incentives. Some years ago it was suggested that “technology dyads” between the U.S. and Mexico could go a long way toward resolving mutual suspicions and ensure long-term energy security for both. There is evidence that something like this filters through the relationships among the NRCan, U.S. DOE and SE. We recommend that these initiatives should extend more deeply into the NAFTA relationships, and that there may be a proper role for Canadian, U.S. and Mexican universities to play in this regard.

## **APPENDIX – GAS AND ELECTRICITY MARKETS IN NORTH AMERICA North American Overview**

In preparing this report, we relied upon a wide array of data and information sources. For those readers of this report who are not familiar with the North American situation, this Appendix provides a summary of natural gas and electricity systems, recent history and current conditions. For baseline conditions we relied upon the following reports.

- National Petroleum Council (NPC), December 1992, *The Potential for Natural Gas in the United States*. This comprehensive study includes information on Canada and Mexico. The NPC will initiate an update this year.
- U.S. Department of Energy and Secretaría de Energía, Minas y Industria Paraestatal (now Secretaría de Energía or SE), 1991, *United States/Mexico Electricity Trade Study*.

In addition to these two studies, abundant information on the Canadian, U.S. and Mexican natural gas and electricity systems and markets is available from the following sources.

#### Canada:

- Natural Resources Canada (NRCan, <http://www.nrcan.gc.ca/>).
- National Energy Board-Canada (NEB, <http://www.neb.gc.ca/>).
- Canadian Association of Members of Public Utility Tribunals (CAMPUT) for information on individual provincial regulatory boards and trends. Most of the large provincial regulatory boards in Canada and the provincial energy ministries provide some reporting.
- Canadian Association of Petroleum Producers (CAPP, <http://www.capp.ca/>).
- Canadian Gas Association (CGA, <http://www.cga.ca/>).
- Canadian Electricity Association (CEA, <http://www.canelect.ca/>).

#### United States:

- U.S. Department of Energy, Energy Information Administration (U.S. EIA, <http://www.eia.doe.gov>). See especially the annual *Natural Gas Trends* and *Electric Power Annual*.
- U.S. Federal Energy Regulatory Commission (FERC, <http://www.ferc.fed.us/>).
- National Association of Regulatory Utility Commissioners (NARUC, <http://www.naruc.org/>) for information on individual state and provincial regulatory commissions and trends. Most of the large state regulatory commissions or other agencies that track energy production and use provide some reporting.
- National Petroleum Council (NPC, <http://www.npc.org/>).
- Natural Gas Supply Association (NGSA, <http://www.ngsa.org/>).
- American Gas Association (AGA, <http://www.aga.com/>).
- Gas Research Institute (GRI, <http://www.gri.org/>).
- Electric Power Research Institute (EPRI, <http://www.epri.com/>).
- Edison Electric Institute (EEI, <http://www.eei.org/>).
- National Regulatory Research Institute (NRRI, <http://www.nrri.ohio-state.edu/>).

#### Mexico:

- Secretaría de Energía (SE, <http://www.access.digex.net/~ermine/se.htm>).
- Comisión Reguladora de Energía (CRE, <http://www.cre.gob.mx/>).
- Petroleos Mexicanos (Pemex, [www.pemex.gob.mx/](http://www.pemex.gob.mx/)) annual reports and statistical reviews.
- Comisión Federal de Electricidad (CFE, <http://www.cfe.gob.mx/>) annual reports and statistical reviews.

The Reference section to this report provides additional sources of data. Numerous private and trade publications were also used. Examples are: *Natural Gas Week* and *World Gas Intelligence* (Energy Intelligence Group, New York), *Foster's Natural Gas Report* (Foster Associates, Washington, D.C.), *Latin American Energy Alert* (Target Research, Washington, D.C.), *Gas Daily and Megawatt Daily* (Pasha Publications, Washington, D.C.), *Public Utilities Fortnightly* and associated products (Public

Utilities Reports, Vienna, Virginia), and the annual reviews of North American natural gas and electricity prepared by Cambridge Energy Research Associates/Arthur Andersen (Cambridge, Massachusetts).

The largest energy user in North America is the U.S., although per capita consumption and energy intensity in Canada are higher (Table A-1). Mexico is the smallest user of energy but the largest in energy intensity, indicating substantial inefficiencies in that energy sector.

**Table A-1. Energy Use in North America**

<b>1995:</b>	<b>Canada</b>	<b>United States</b>	<b>Mexico</b>	
Total Energy Consumption	11.7	94.3	5.6	Quadrillion Btu
Consumption per Capita	395.9	352	59.5	Million Btu
Energy/GDP	24.5	17.3	36.0	Quad Btu

*Source: U.S. EIA*

The U.S. (Lower 48 states) has the largest total reserves of natural gas (**Table A-2**). It is both the largest producer and consumer of natural gas. Canada, however, is the premier natural gas exporter in North America. Balance in the U.S. natural gas system is mainly achieved with imports from Canada. Mexico principally uses cross-border trade to balance its system.

**Table A-2. North American Natural Gas Profile**

<b>1997 (bcf)</b>	<b>Canada</b>	<b>United States</b>	<b>Mexico</b>
Reserves	740	1,295	252
Gas Production	5967	18939	1779
Gas Consumption	3121	21898	1792
Gas Exports	2903	95	6
Gas Imports	57	2919	19

*Sources: NPC, NRCAN, U.S. EIA, and Pemex. 1997 data for Canada and the U.S. are preliminary.*

*Reserves are proven, probable and potential and include both conventional and unconventional reservoirs. Exports and imports are for pipelines only (excludes LNG).*

As with natural gas, the U.S. is North America's largest producer and consumer of electricity (Table A-3). Exports are a much smaller proportion of Canada's total electricity production than for gas.

**Table A-3. North American Electricity Profile**

1996	Canada (terrawatthours, twh)	United States (billion kilowatthours)	Mexico (gigawatthours, gwh)
Electricity Generation	549	3,629	145
Electricity Consumption	511	3,389	134
Electricity Exports	45	9	1
Electricity Imports	8	47	1

Source: U.S. EIA

In the U.S. and Canada, most natural gas is used for residential heating (Table A-4). In Mexico, most natural gas is used as feedstock for petrochemicals operations. Most power generation in Canada is hydro. In Ontario, nuclear is the dominant generation type and in Alberta gas competes with coal as it does in many areas of the U.S. Natural gas use among U.S. electric utilities is a mere eight percent. Among nonutility producers, however, natural gas is used 65 percent of the time. Although nonutility generation (NUG) is growing, it still constitutes only about 12 percent of total generation. Therefore, while NUG facilities represent a growing market for natural gas, it is, at the current time, an incremental one. Fuel oil is most often used for power generation in Mexico. This is a function of inadequate refining capacity that would reduce the amount of resid that is placed in the domestic power sector and yield higher cuts of lighter and greatly needed products.<sup>177</sup> The most significant difference among the three countries lies in efficiencies of the respective electricity systems. Nontechnical losses in Mexico are quite high, upwards of 30 percent on some portions of Mexico's grid. The average of 15 percent for the system as a whole is comparable to other emerging markets in Latin America and elsewhere.

**Table A-4. Natural Gas and Electricity Patterns**

1997	Canada	United States	Mexico
<i>Natural Gas as % of:</i>			
Total Energy Production	35	28	13
Total Energy Consumption	26	25	20
<i>Natural Gas Consumption, %</i>			
Residential	26	24	6 <sup>c</sup>
Industrial	39	40	61 <sup>d</sup>
Commercial		14	
Electric Power Generation	2	31 <sup>a</sup>	33
<i>Electricity Consumption, %</i>			
Residential Use	26	35 <sup>b</sup>	19
Industrial Use	41	33 <sup>b</sup>	50
Commercial Use	20	29 <sup>b</sup>	10
Losses	7	7	15

Sources: U.S. EIA, Pemex

**Notes:**

<sup>a</sup> Includes both utility and nonutility consumption of natural gas.

<sup>b</sup> Electric utilities, only.

<sup>c</sup> Residential/commercial.

<sup>d</sup> Heavy industry.

Within Canada, the U.S. and Mexico, natural gas and electricity production and use vary widely across regions. A synopsis of regional variation in each country is provided in the individual country sections below.

## **International Trade**

Our report details international trade from the legal/institutional perspective in Part II. An overview of the major cross-border interconnections for natural gas and electricity are provided below. Included are some of the major proposals for expanded cross-border trade.

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### **Natural Gas – Major Cross-Border Interconnects**

*Canada/U.S. (Total capacity 8.3 bcf/d)*

- Huntingdon and Kingsgate, British Columbia: Total capacity 3.5 bcf/d. Proposed: Alliance pipeline, Fort St. John, B.C. to Chicago, 1.3 bcf/d.
- Monchy, Saskatchewan: Total capacity 1.5 bcf/d
- Emerson, Manitoba: Total capacity 1.2 bcf/d. Proposed: Viking Voyager pipeline, Emerson to Joliet, Illinois, 1.4 bcf/d.
- Niagara Falls, Iroquois and other, Ontario: Total capacity 2 bcf/d.
- Eastern Canada: Proposed Maritimes pipeline, Sable Island to U.S. Northeast, 400 mmcf/d.

*U.S./Mexico (Total capacity 1.2 bcf/d)*

- San Diego, California: Proposed pipeline to Rosarito generation stations, 300 mmcf/d.
- Naco, Arizona: 35 mmcf/d.
- El Paso and Eagle Pass, Texas: Total capacity 174 mmcf/d.
- El Paso: Under development, pipeline to Samalayuca generation stations, 450 mmcf/d.
- McAllen, Texas: Total capacity 350 mmcf/d (Texas Eastern interconnect, principle facility for cross-border trade with potential capacity to 1 bcf/d).
- Penitas, Texas: Total capacity 400 mmcf/d.

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### **Electricity – Major Cross-Border Interconnects**

*Canada/U.S. (Total capacity 5,895 kv)*

- Western System Coordinating Council (WSCC, B.C. and Alberta) to WSCC in U.S.: Total capacity 960 kv
- Mid-Continent Area Power Pool (MAPP, Saskatchewan and Manitoba) to MAPP in U.S.: Total capacity 960 kv
- Northeast Power Coordinating Council (NPCC, Ontario) to East Central Area Reliability Coordination Agreement (ECAR) and Mid-Atlantic Area Council (MAAC) in U.S.: Total capacity 2,760 kv
- NPCC (Quebec) to MAAC in U.S.: Total capacity 1,215 kv

*U.S./Mexico (Total capacity 1,107 kv)*

- WSCC (California to Baja): Total capacity 495 kv synchronized
- Electric Reliability Council of Texas (ERCOT): Total capacity 612 kv unsynchronized (backup and emergency only)

**Note:** WSCC, MAPP, NPCC, ECAR, MAAC and ERCOT are subdivisions of the National Electricity Reliability Council (NERC)

Physical integration of gas and electricity systems can only occur via interconnects. This is true not only at the international level, but within each country as well and is most clearly the case in Canada and the U.S. (Importantly, “paper” transactions conducted through trading and risk management programs are less constrained by geographical infrastructure. Consequently, integration can be considered in two dimensions, depending upon whether it is the physical systems themselves that are of interest or the financial markets.) Where Canada and U.S. natural gas pipelines and electricity reliability regions intersect at the international border, energy trade is more vigorous than in portions of each country that are remote from the international border. This is a primary component of the regionalized trade patterns observed and the role that regionalization might play in expanded international trade, as we discuss extensively throughout our report. Because the operation of electricity transmission and distribution grids is a function of resistivity, electricity trade tends to affect a much wider portion of national grids unlike natural gas which is more easily controlled and dispatched to specific market destinations. If all proposed new cross-border capacity for natural gas shipments from Canada to the U.S. is installed Canadian exports will rise by more than one trillion cubic feet per year. For the major projects listed above this is very likely, since existing capacity is being used to nearly its fullest extent. Discussions also are underway to expand cross-border electricity interconnects between the U.S. and Canada, particularly to increase the amount of electricity that is exported from Quebec (from some discussions, HydroQuebec means to increase exports by two to three times current levels). In the case of Mexico, not only are interconnect capacities much smaller but in the case of electricity the differences between Mexico’s synchronized system and ERCOT’s asynchronous grid implies a more significant technological barrier that must be overcome if cross-border trade through ERCOT is to be realized. The Texas Eastern pipeline interconnect in northeastern Mexico is a relic of the ultimately failed negotiations, including the Border Gas Agreement discussed in Part II, between the U.S. and Mexico regarding a gas export program.

## **Industry Ownership and Organization**

The U.S. is unique in both North America and worldwide for private ownership of energy and non-fuel mineral resources (Table A-5). Energy industry ownership and organization has a great influence in North America on the character of the respective energy sectors and the extent of reliance on markets. For example, Table A-5 makes clear that upstream management (conservation policies) varies across North America. At one time, Canada and Mexico were more closely aligned with public ownership of resources and strong tendencies to reserve the benefits of resource wealth for the needs of domestic populations. Over the years Canada has moved sharply toward, and in some respects exceeded, the U.S. position in treating natural gas as a commodity and allowing commercial interests to take precedence. In return, domestic customers have been allowed to benefit from the more competitive industry.

**Table A-5. North American Natural Gas and Electricity Organization**

	Private ←	→ Public
<b>Natural Gas:</b>		
Resource Ownership	U.S. (“fee” minerals)	<b>Canada</b> (provincial and federal Crown lands) <sup>1</sup> U.S. (state and federal lands) <b>Mexico</b> (national patrimony)
Resource Development	<b>Canada</b> U.S.	<b>Canada</b> – (PetroCanada, but Crown ownership now less than 20%) <b>Mexico</b> – Petroleos Mexicanos (Pemex)
Pipelines	<b>Canada</b> U.S.	<b>Mexico</b> (Pemex; under new regulations, private investment in pipelines allowed)
Distribution	<b>Canada, U.S.</b> (majority of utilities are investor owned) <b>Mexico</b> (14 private distribution companies)	<b>Canada</b> (municipal utilities) U.S. (municipal utilities) <b>Mexico</b> (Pemex; under new regulations, Pemex franchises converted to private ownership)
<b>Electricity:</b>		
Generation	<b>Canada</b> (investor owned utilities, cooperatives, private producers) U.S. (investor owned utilities, cooperatives and private producers)	<b>Canada</b> (provincial Crown utilities, some munis) U.S. (federal power authorities, municipal utilities) <b>Mexico</b> (Comisión Federal de Electricidad, CFE)
Transmission	<b>Canada</b> (investor owned, co-ops) U.S. (investor owned, co-ops)	<b>Canada</b> (provincial grid) U.S. (federal authorities) <b>Mexico</b> (CFE)
Distribution	<b>Canada</b> (investor owned, co-ops) U.S. (investor owned, some co-ops)	<b>Canada</b> (provincial utilities, municipals) U.S. (municipals) <b>Mexico</b> (CFE; Luz y Fuerza del Centro in Mexico City)

Notes:

<sup>1</sup> Approximately 90 percent of Canada’s natural gas resource base is owned by provincial Crown governments. Some private lands and fee minerals exist in southern Alberta. The federal Crown controls offshore regions (eg., eastern Canada) although provincial Crown governments provide oversight (see Table A-5).

### General Policy Organization

Canada and the U.S. have strongly similar systems of regulatory oversight, in keeping with the greater reliance on markets and regulation as a substitution for competition wherever market failure exists (Table A-6). Canada and the U.S. are also strongly similar in the decentralized nature of their regulatory systems, with substantial authority vested in provincial and state regulatory commissions. Examples are the Alberta energy Utilities Board (AEUB), which regulates exploration and production

(conservation) and gathering and rates on Nova’s intraprovincial system, and the Texas Railroad Commission (TRC) which performs the same functions in our state. Unlike Alberta, which some years ago combined oversight for natural gas and electricity into the one board, Texas maintains two agencies with the PUC having authority over electricity. Another interesting exception in the U.S. is Nebraska, in which all utilities are public and therefore no regulatory bodies exist. Mexico’s national energy companies are self-regulated although energy pricing, supply and access are controlled through centralized planning processes in contrast to the market-based systems in Canada and the U.S. Mexico’s new regulatory system for private activity in monopoly activities like natural gas distribution is also centralized at the federal level.

**Table A-6. General Regulatory Oversight in North America**

<b>Regulatory Oversight:<sup>1</sup></b>	<b>Canada</b>	<b>United States</b>	<b>Mexico</b>
<b>Natural Gas</b>			
<i>Resource Access and Development:</i>			
Privately owned minerals	Provincial energy utility boards (EUBs) and energy ministries	State conservation commissions	N.A.
Under state/provincial lands	EUBs and ministries	State conservation commissions (or other state entities for leasing)	N.A.
Under national lands	N.A. (Federal agencies are coordinating with provincial governments for Eastern Canada offshore projects)	Federal agencies with specific authority Onshore – Bureau of Land Management, Forest Service, etc. Offshore – Minerals Management Service	Pemex (self-regulated) with a committee of ministries, including SE (chair) and Hacienda (finance), and Presidential authority for planning
<i>Pipelines:</i>			
Intra- provincial or state	EUBs	State public utility commissions (PUCs)	Comisión Reguladora de Energía (CRE)
Inter- provincial or state	National Energy Board, Canada (NEB)	Federal Energy Regulatory Commission (FERC)	CRE
<i>Distribution</i>	EUBS	PUCs	CRE
<i>Exports</i>	NEB	FERC	N.A. (Pemex)
<i>Imports</i>	N.A.	N.A.	CRE (for private projects), Pemex (self regulated)

<b>Regulatory Oversight:</b>	<b>Canada</b>	<b>United States</b>	<b>Mexico</b>
<b>Electricity</b>			
<i>Generation</i>	EUBs (for utilities only)	PUCs (for utilities only)	CFE (self-regulated) with a committee of ministries, including SE (chair) and Hacienda (finance), and Presidential authority for planning; CRE (new plants with private participation only)
<i>Transmission:</i>			
Intra- provincial or state	EUBs; reliability councils	PUCs; reliability councils	CFE
Inter- provincial or state	NEB; participation in reliability councils	FERC; participation in reliability councils	CFE
<i>Distribution</i>	EUBs	PUCs	CFE

Notes:

<sup>1</sup> Environmental oversight is decentralized in both Canada and the U.S., centralized at the federal level in Mexico.

In general, Canada and the U.S. have followed roughly parallel pathways to the development of natural gas and electricity services, with regulated private monopolies providing much of the capacity except where noted in Table A-5. The regulatory approach in both countries has tended toward the cost-of-service or rate of return methodology, in which regulators determine a “just and reasonable” rate of return on a depreciated ratebase (a company’s capital assets and the most politically sensitive component of the equation) and operating and maintenance costs. The allowed profit is spread across customer classes in such a way as to generally (though not effectively) minimize cross-subsidies and other distortions. In exchange for protected service franchises, the regulated monopolies have satisfied strict “obligation to serve” conditions, the universal service requirement mentioned earlier. Unlike many other countries, however, companies traditionally have been allowed to terminate service to nonpaying customers, although this has varied historically and among individual provinces and states. This institutional arrangement, regulated private monopoly, has tended to be very much the same among provincial, state and federal jurisdictions and across natural gas and electric power industry segments. In addition, the various regulatory bodies listed in Table A-6 for Canada and the U.S. tend to be organized and operate in similar fashion, the result of an evolving regulatory technology and diffusion of that technology across jurisdictions as described in Part II. The goal, in both countries and among the many jurisdictions, has been to strive for prices and service that would be roughly equivalent to what might be gained in a competitive marketplace. The institutional arrangement of regulated monopoly reflects the technical economies of scale that exist in natural gas and electricity transport systems and early thinking that competitive pricing could not be achieved, or that it might not be desirable if the objective is to encourage risk-taking ventures in building infrastructure.

As the natural gas and electricity industries in Canada and the U.S. evolved, distortions, disruptions and challenges arose in several areas.

1. Management of natural gas exploration and production, an activity best left to competitive enterprises with coordination for efficient resource extraction provided by government bodies.
2. Bottlenecks in the natural gas transport systems.
3. Emergence of highly efficient natural gas turbines for electric power generation that have changed the economics of the industry and caused many of the larger scale utility investments to become outmoded.
4. Emergence of sophisticated information systems for marketing, real time trading and risk management, facilitating decentralized transactions for natural gas and electricity outside of what the existing firms provided.

Canadian and U.S. policy makers and regulators at all jurisdictional levels have adopted parallel approaches in each instance.

1. Streamlined control of natural gas production in order to maximize efficiency in terms of both reservoir management and inventory control (the amount of deliverable gas in a producer's portfolio at any one time) induce competitive wellhead pricing.
2. Eliminate the merchant or "middleman" role of interprovincial and interstate pipelines, as both contractors of supply and delivery. Facilitate nondiscriminatory "open access" or third party carriage on pipeline systems (prevent favorable treatment by pipeline companies of their marketing affiliates for transportation services). Encourage unbundling of physical transportation from the gas product and associated services to allow a competitive gas commodity market to take hold. Push nondiscriminatory, unbundled open access concepts down to local distribution of gas.
3. Transfer nondiscriminatory, unbundled open access concepts to the electric power industry in light of the new economics of power generation. In many instances, proposals are to treat the generation of electricity much like the production of natural gas, as a competitive activity with benefits allowed to flow directly to customers with regulation and coordination limited to transmission and distribution.
4. Allow continued growth and development of marketing, trading and risk management. It is in these areas that natural gas and electricity convergence is most pronounced.

Certainly, these adjustments, taken over some 20 years, have not been without turmoil. Some of the most visible concerns are the extent to which benefits of restructuring natural gas reach small customers, energy security and reliability, environmental protection and, on the trade side, the implications for U.S. producers of expanding Canadian exports of gas and electricity. Throughout Canada and the U.S., there is evidence of new market-based solutions for gas and electricity services. These include the following.<sup>178</sup>

- Initiatives to aggregate low-income customers (a potential solution to the problem of providing universal service under the old regulated utility scheme).<sup>179</sup>
- Distribution cooperatives formed to facilitate increased buying power for small gas utilities in the wholesale market; independent marketers and brokers acting as supply aggregators (one of the earliest outcomes of natural gas industry restructuring in Canada and the U.S.).<sup>180</sup>
- Direct sales programs in Canada targeting small customers and pilot programs in the U.S. for retail choice in gas and electricity service. Canada has experimented much more vigorously with direct sales and retail choice for customers of gas utilities than has the U.S.

On the environmental front, regulators, consumer and environmental groups are reluctant to release companies from their responsibilities as defined in demand side management (a widely adopted strategy for encouraging energy conservation) and integrated resource planning (policies that encourage more comprehensive planning for fuel purchases by firms). The benefits of these

approaches are widely debated. With increased competition, it is unlikely that costly regulatory programs can continue to be applied.

Where Canada and the U.S. overlap with Mexico is in those cases where activities are undertaken by government entities. Canada's Crown corporations, the U.S. power authorities, and Mexico's Pemex and CFE represent budget line items for the respective governments and thus share many of the same issues. As Mexico moves forward, the desire is to implement competition where possible given the constraints of Mexico's constitution but avoid some of the pitfalls experienced in Canada and especially the U.S.

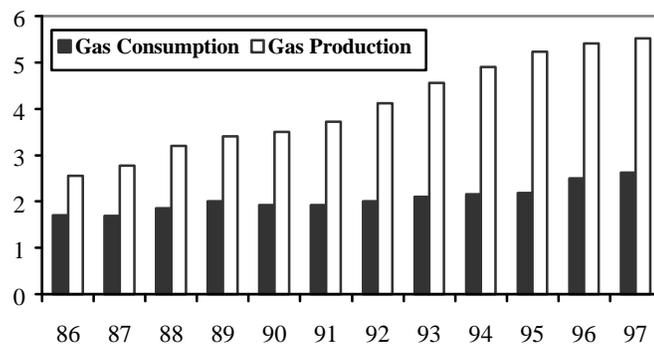
Natural gas and electricity restructuring in Canada and the U.S. is challenging the traditional role played by regulatory bodies. Not only must regulators be market facilitators, as noted in the main body of our report, but also political conflict associated with change requires that regulators also take on the mantle of dispute resolution. Whether regulators and their staffs are well equipped for this task is questionable. Some are, many clearly are not. In Mexico, the CRE is still a young organization charged with large, visible and politically charged responsibilities.

## Individual Country Overviews: Canada

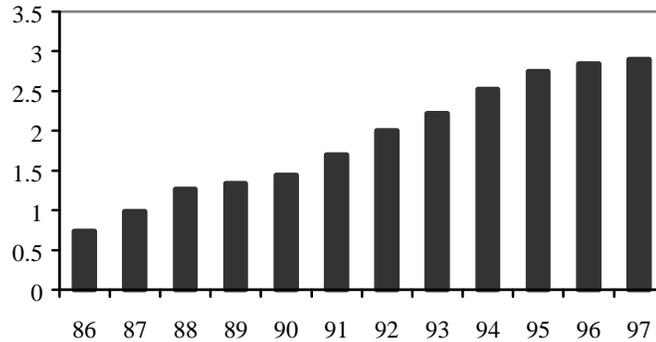
### Overview

Canada's excess of production over consumption and steady growth in exports are shown in Figure A-1 and Figure A-2 (exports from the U.S. to Canada are minimal and thus not shown, although they may be locally significant). Canada supplies approximately 12 percent of U.S. natural gas demand, up from 8.5 percent in 1991. The NAFTA requirement that national and sub-national regulations should not interfere with free flows was a replay of issues surrounding the Canada-U.S. FTA (see Part II on legal considerations). Generally, public opposition to natural gas exports is at a low ebb. Should any question arise about the adequacy of Canada's natural gas resource base, however, public opinion could swing back against aggressive exports.

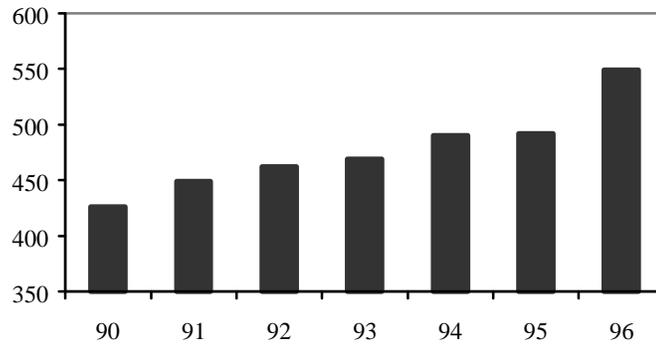
**Figure A-1. Canadian Natural Gas Production, Consumption (tcf/y)**



**Figure A-2. Canadian Natural Gas Exports (tcf/y)**



**Figure A-3. Canadian Generation of Electricity (twh)**



Electricity generation is shown above in Figure A-3. Overall, electricity generation in Canada is 64 percent hydro, 19 percent coal, 16 percent nuclear and one percent oil, gas and other. The most intensive energy use in Canada occurs in the province of Ontario, the largest and most heavily industrialized. Electricity generation in Ontario is 56 percent nuclear, 29 percent hydro and 14 percent coal. In neighboring Quebec nearly all electricity is hydro (97 percent). The low prices charged for Quebec's hydropower relative to Ontario Hydro's expensive nuclear is a source of tension between the two provinces. Most electricity in Alberta is generated from coal or natural gas in proportions very similar to the U.S. In British Columbia, the potential exists for extensive hydro development although environmental issues related to the Pacific Northwest salmon fisheries make this capacity unlikely to be developed in the foreseeable future.

The NEB was founded in 1959 by the National Energy Board Act (NEB Act), similar to the Natural Gas Act (NGA) which gave authority to the U.S. Federal Power Commission to oversee interstate transactions of natural gas. The NEB's powers include the issuing of licenses for short term (up to two years) contracts to export natural gas. However, these decisions are always susceptible to being overridden. The NEB also oversees pipeline construction, including environmental screening, on behalf of the public interest. In the upstream market, producers must report to both NEB and the AEUB. For example, to move gas out of Alberta a removal permit must be obtained from AEUB along with a license order from NEB. There have been recent efforts to eliminate this duplication.

The chronology of Canada's natural gas restructuring is shown in Table A-7. In 1985, Canada moved aggressively to promote market-based pricing for gas with flexible open accessed-based transportation arrangements. In comparison, the U.S. completed a comparable transition in 1992. Canada also implemented a number of regulatory decisions that would enhance export markets for

Canadian gas. The combination of actions by the NEB and provinces substantially increased competition in Canada's domestic markets and cemented export relationships for Canadian producers and pipelines. Recent adjustments (see Current Topics and Issues below) will further enhance the competitiveness of Canadian producers in U.S. markets.

**Table A-7. Canada Natural Gas Policy/Industry Restructuring**

<b>Prior to 1975</b>	The price for inter-provincial natural gas trade is determined by negotiation between producers and TransCanada PipeLines (TCPL). TCPL is the sole purchaser and carrier of gas into inter-provincial markets east of Alberta, selling its gas to provincial distributors at the citygate negotiated prices. The National Energy Board (NEB) regulates the transportation component of the price.
<b>The Petroleum Administration Act of 1975</b>	Provides for the federal prescription of citygate prices and leads to the negotiation of the first Canada/Alberta Gas Pricing Agreement effective November 1, 1975. Since 1975, the prices of Alberta natural gas sold in inter-provincial trade have been administered under the agreements between the governments of Canada and Alberta. During this period, natural gas prices are linked to crude oil prices.
<b>November 1, 1984</b>	The Government of Canada revises its export pricing policy to allow Canadian companies to export gas to U.S. buyers at negotiated prices. The policy also makes provisions for short-term exports of natural gas by order, subject to volume limitations.
<b>March 28, 1985: The Western Accord (Open Access Rule)</b>	The Governments of Canada, Alberta, British Columbia, and Saskatchewan agree that a more flexible and market-oriented pricing regime is required for the domestic pricing of natural gas.
<b>Deregulation of Crude Oil Prices</b>	Oil may be purchased from Canadian or foreign sources without restrictions on volume, pricing, and at prices freely negotiated between buyers and sellers. The Canadian Government agrees to remove export charges on oil and petroleum products. The Canadian Government will step in to control the market in extreme circumstances to protect the interests of Canada.

<p><b>Domestic Natural Gas Pricing and Changes in Fiscal Principles</b></p>	<p>A task force of senior officials from the federal government and the provincial governments are assigned to develop a more flexible market-sensitive pricing mechanism on or before November 1, 1985. TransCanada Pipelines tariff subsidies will be terminated. The Natural Gas Market Incentive Plan in Alberta will be phased out. Market Development Incentive Payments from Alberta to Canada will be capped in tandem with a termination date. The Petroleum and Gas revenue tax will be phased out to encourage the industry to reinvest in the development of new oil and gas resources for Canada. For companies already not paying this tax, new exploration and development write-offs will be instituted to provide a similar cost benefit.</p>
<p><b>October 31, 1985: The Agreement on Natural Gas Markets and Prices</b></p>	<p>This agreement completes the process of the Western Accord. The agreement provides for:</p> <ul style="list-style-type: none"> <li>• Direct sales at prices and terms freely negotiated between producers and distributors or large industrial users, provided transportation service is made available by consumer provinces' regulatory bodies;</li> <li>• Competitive marketing programs under which distributors will be permitted to offer discounts to meet competition;</li> <li>• Export floor prices based on regional price tests rather than a single Toronto price;</li> <li>• An NEB review of TCPL's services in light of the new pricing system to ensure equitable access to this system;</li> <li>• Removal of volume restrictions on short-term natural gas exports; and</li> <li>• A comprehensive review of the role and operations of inter-provincial and international pipelines.</li> </ul>
<p><b>May 1986: NEB's Reason for Decision (RH-5-85)</b></p> <p><i>Availability of T-Service</i></p>	<p>Per the request for review in paragraph 7 of the Agreement on Natural Gas Markets and Prices of October 31, 1985 the NEB issued the following decisions.</p> <ul style="list-style-type: none"> <li>• The board decides that the displacement proviso presently included in TransCanada PipeLines Limited's (TCPL, TransCanada) T-Service, Short-Term T-Service (SST), Interruptible Transportation (IT) and T-A01 Toll Schedules be removed in order that transportation service can be made available to direct purchasers of natural gas displacing gas supplies previously acquired from TCPL.</li> </ul>

<i>Duplication of Demand Charges</i>	<ul style="list-style-type: none"> <li>The Board decides that the duplication of demand charges resulting from displaced volumes is inappropriate. Effective November 1, 1986 the Board will implement a new system of toll design and allocation for TCPL based on the establishment of an operational demand volume for the purpose of determining demand tolls. This also led to the definition of displacement.</li> </ul>
<b>Creation of the NEB's "Market Based Procedure" (MBP) for natural gas exports through Decision (GHR-1-87)</b>	As a replacement to the outdated R/P Ratio Procedure the NEB creates the Market-Based Procedure to ensure that natural gas licensed for export is surplus to reasonably foreseeable Canadian requirements. This will be achieved through public hearings involving a complaints procedure, an export impact assessment from the applicant, and a public interest determination on the part of the board. In conjunction to the public hearings the NEB will monitor the Market-Based Procedure. This will include assessments of Canadian energy supply and demand and the natural gas market.
<b>November, 1990 NEB's adoption of rolled-in tolls from Decision (GH-5-89)</b>	The Board decides that when new facilities are completed they will become an integral part of TransCanada's pipeline system and will not be associated with or dedicated to any individual shipper's gas.
<b>February 2, 1995: NEB revision of rules governing the secondary market</b>	The NEB decides to remove the cap on selling rights to transportation capacity at prices above the regulated toll. The board also decides that mandatory reporting of capacity is not necessary.
<b>National Energy Board Rules of Practice and Procedure, 1995</b>	Stipulates that NEB pipeline certificates and natural gas export licenses are subject to the approval of the Governor in Council. This requirement does not pertain to tolls and tariffs.

With regard to electricity, the situation in Canada is quite variable. Unlike the U.S., the national government has not pursued broad-based initiatives, leaving the provincial governments to experiment. This is a function of how Canada's electricity sector is organized. It is based at the provincial level and the provincial Crown governments own a significant portion of the assets. The NEB has no authority unless electricity trade becomes interprovincial or international.

The Crown corporations have similar attributes.

- The provincial governments own them.
- They are not subject to competition rules.
- They have diverse portfolios with respect to electricity generation.
- They are driven by revenue needs to export to the U.S. It is the export environment that makes the Crown corporations increasingly subject to market pressures.

The difficult issues posed by electricity restructuring in the context of provincial ownership are typified by Ontario Hydro, the publicly owned (Crown) electricity company in Canada's most populous province. While events in Ontario are not necessarily a guide to actions in other provinces,

its role as the seat of Canada's national government coupled with the generally pro-free markets view in most provinces suggests that considerable attention should be paid to developments there. In November 1995, a seven-member committee chaired by the highly respected Liberal Donald S. MacDonald was given a mandate by the Progressive Conservative Ontario government to make recommendations regarding Ontario Hydro's future status. The MacDonald Report issued on June 7, 1996 recommended that Ontario Hydro's monopoly in electricity generation facilities — including enormous stranded assets<sup>181</sup> in nuclear generation — should have a single owner and compete with other generating firms. The report also recommended that the transmission portion of Ontario Hydro be reorganized as a natural monopoly and that the practice postage stamp pricing be continued. Because of political uncertainty about the extent to which MacDonald Commission recommendations would be implemented, cross-border electricity investment was put on hold, although long-run prospects are promising.

Some of the specific proposed changes included the following.

1. Implement open access to the electricity system. This would take place in two stages, with the first being wholesale competition (third party access for users that use at least 5MW of electricity). The second stage would be the retail stage in which residential users would actually be able to choose their electricity suppliers.
2. Access to both transmission and distribution would be open and nondiscriminatory.
3. Ontario Hydro's monopoly in generation would be dissolved. Private equity in some portion of the generation sector would be allowed, though the nuclear and hydrogeneration would remain in the public domain (Advisory Committee on Competition in Ontario's Electricity System, 1996).

Few of the MacDonald Commission recommendations were indeed accepted. As mentioned in Part IV, a two-year transition will result in the transition of Ontario Hydro into a provincially owned generation company, a provincially owned transmission company and a provincially owned retail company. Each will have a "distinct" role in a new competitive market, although it is unclear how companies other than the Crown utilities will operate in the restructured market.

In contrast to Ontario, Alberta increased competition in the power sector with the Electric Utility Act (EUA) of 1995. Although the Act is only the first step toward total competition, it creates a competitive framework for the generation sector. Furthermore, regulators now have the right to use incentives to protect consumers from excessively high prices. The EUA facilitated creation of the Alberta Power Pool, a bid-based market dispatch arrangement. The three major utilities, TransAlta Utilities, Alberta Power and Edmonton Power formed an independent gridco (Grid Company of Alberta, Inc.). A small number of distribution companies bid for power on an hourly basis, in a system designed to return total cost recovery of existing generation. The Alberta approach does not provide for a competitive bulk market, although this will likely emerge before the end of the century.

Alberta offers perhaps the simplest situation for electricity restructuring. Importantly, the province of Quebec has elected, thus far, to refrain from restructuring HydroQuebec choosing to focus instead on electricity export growth. Other Canadian provinces are moving at a slow pace as well.

## ***Current Issues and Topics***

### ***Natural Gas***

While the province of Alberta is well known for the extent of hydrocarbon reserves in the Western Sedimentary Basin, it is Eastern Canada that has been attracting attention. Production is finally underway at the massive Hibernia project, long a bane of both the Canadian government and industry.

In addition, gas production from Sable Island should reach markets in Eastern Canada and the Northeastern U.S. next year.

Three issues tend to recur in Canada's producer segment. First, we stated in several instances that a potential problem in Canada is increased resistance to exports. This could create real political friction, because Canadian producers depend substantially on U.S. markets. In 1991-92, a prolonged battle ensued between the California PUC (CPUC) and Alberta producers, the provincial government and NEB over long-term supply contracts to California utilities. (The dispute was ultimately settled in a way that reflects mutual interests between Canadian suppliers and California consumers. Canadian interests consistently argued, in response to the CPUC preference for spot contracts, that market adjustment decisions can readily be incorporated into Canadian corporate planning.) The main worry in Canada during this time was that California would grab all of the cheap supply. In Alberta, as in all provinces, the Crown government owns all of the resources and thus can be expected to play some role in contract negotiations; major supply contracts always include a share of the profits to the Crown. It has typically been in the Crown's interest to keep prices high, at least in the domestic market (and to the detriment of domestic users). A parallel exists in the U.S., when state conservation policies from time to time result in restricted production and higher prices ("prorating"). Thus, although Canada and the U.S. seem to share market-oriented values, there are still major issues to be dealt with but few mechanisms for resolution. Within Canada the tension stems from the inherent conflict of interest within public sector. Within the U.S. it stems from "producer state-consumer state" conflicts.

A second issue is resource management. Canadian producers and the provincial governments have also locked horns over the years on demonstration of natural gas reserves and deliverability. Typical requirements in Alberta were for reserve inventories to be maintained at 25-year R/P (reserve to production) levels, a quite expensive proposition for producers. Requirements have been reduced so that Canadian operators now maintain R/P ratios comparable to those in the U.S. of nine to ten years. While the extent of the resource base in the Western Sedimentary Basin is fairly well known, doubts still remain in some quarters that lower deliverability requirements can support growing domestic demand and accelerating exports.

The third issue is the relationship between Canadian producers and pipelines. We noted in Part IV the recent resolution between producers and pipelines to emphasize competition and market-based approaches. This was achieved through an NEB technical workshop.<sup>182</sup> The increased cooperation that can be expected from this resolution overlaps with historical approaches taken in Canada and the U.S. toward pipeline tariffs. One of the more interesting differences between Canada's NEB and the U.S. FERC lies in tolling methodologies for pipelines — rolled-in (NEB rules) versus incremental (FERC rules). In 1991, the FERC ordered that cross-border expansion costs should be tolled on an incremental basis, but the decision was remanded to the agency by the U.S. Court of Appeals, Washington D.C. Circuit because it was "unfair to apply a new policy, without notice to projects constructed in good faith reliance on the established commission policy in effect at the time of the certification and construction of the expansion facilities." Accordingly, on July 26, 1996 the FERC reversed its decision and allowed rolled-in treatment for four Great Lakes expansion projects. This evidence indicates a clear movement toward regulatory harmonization, though differences of opinion remain.

NRCan's position is that the incremental toll methodology does not facilitate pipeline expansion, in spite of arguments in favor of marginal cost pricing as a means of attaining economic efficiency. NEB also has always supported using rolled-in for capacity in Canada. The positions of the Canadian agencies tend to support those of shippers. The FERC emphasizes consumer interests, and therefore incremental pricing is the method of choice. But there is no direct test to compare the relative costs

and benefits. The debate on toll methodologies is of greater consequence for the Canadian interests, but within the next five years it will fade as an issue as the number of export points and options increases and with the producer-pipeline resolution in place.

As noted earlier, LDCs in Canada have moved most aggressively with unbundling programs. Every major province save Saskatchewan allows all customers to participate (industrial down to residential). Saskatchewan LDCs only unbundle non-core (nonresidential) users. Alberta, B.C. and Quebec LDCs have limited their restructuring to competitive sales or transport services.

### *Electricity*

Important differences distinguish Canada's natural gas and electricity industries. The policy and regulatory leadership for natural gas is nationally focused while the framework for electricity is provincial. (This raises the transaction cost issue discussed in Part II). In addition, the fact that the natural gas sector is dominated by private interests and is an economic success contrasts sharply with domination of the electricity sector by publicly owned corporations. Some of the Crown corporations have enormous stranded asset problems — most importantly, Ontario Hydro — that raise major obstacles to privatization and competition. Natural gas is widely available in Canada. Eighty-nine percent of homes in Alberta and 73 percent in Ontario use natural gas. While it is (as yet) unavailable in the Maritime Provinces and available to only 40 percent of homes in Quebec, extremely cheap waterpower resources for the generation of electricity probably negatively impact the economics for natural gas-fired power in these provinces. The Canadian natural gas industry has little to fear from foreign competition. Restructuring policies generally compel conclusions that natural gas in Canada provides the model for free trade and investment. Survey data indicate that it is a highly respected fuel that presents few problems even to environmental groups.

The domestic electricity front is also a consideration. Ontario Hydro has not been very cooperative with government plans to break it up into smaller units, on the argument that North America needs a major player in Ontario. Unlike the U.S. or European Union, Canada condones interprovincial trade barriers. If it weren't for the politics of provincial appeasement, the federal government could remove those barriers — a necessary step toward integration of the North American electricity market. Both Ontario Hydro and Hydro-Quebec want to export more power to the U.S., which means compliance with the FERC. Reciprocity requirements in turn mean allowing wholesale access within each respective province. Once sales begin to occur, Americans will take a hard look at the Crowns, their tendency toward self-regulation and lack of adherence to the provincial EUBs. The desire for access to U.S. transmissions systems will mean that special rules no longer apply.

The Alberta Power Pool is the first provincial electrical system to offer open access, allowing measured competition in the supply of wholesale electricity. However, in an interesting counter to the situations with Ontario Hydro and Hydro-Quebec, one of the primary drivers for restructuring was the failure of the old regulatory regime to deal effectively with the decrease in demand growth for electric power.

### *International Trade*

One main issue between the U.S. and Canada is the distinct definition of competition. Because of powerful business oligopolies and the fact that the provincial Crown governments own such a large portion of productive assets, a "free market" in Canada includes informal cartels that can block smaller companies from entry. These sorts of cartels would attract antitrust investigations in the U.S.

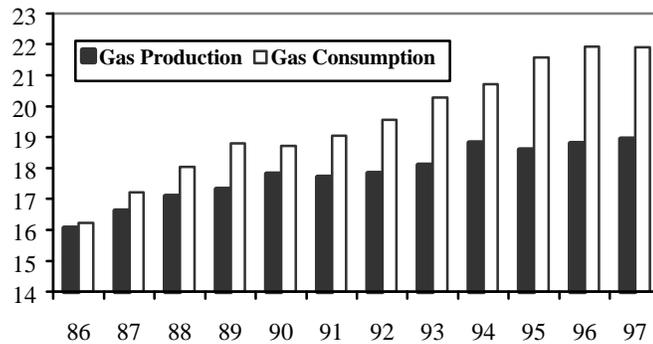
In Canada, if it is in the interest of the Crown monopolies to keep prices high, then there will be little incentive to break up informal cartels. This could pose problems in the future.

Since the NAFTA included most of what was already agreed upon in GATT, one of the most radical changes in the NAFTA occurred in the electricity sector (see Part II). The NAFTA is much more restrictive on disallowing trade barriers. For example, under the NAFTA, there are no export taxes allowed, whereas they are allowed under GATT. Thus, although NAFTA's energy chapter made little difference for electricity trade with Mexico, there were substantial changes for Canada's electricity sector that came with the signing of the agreement because of conditions elsewhere in the treaty.

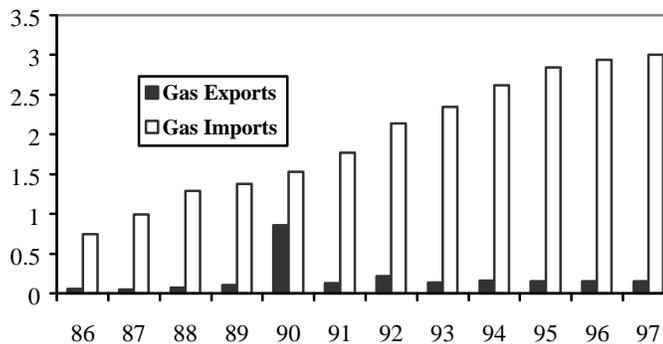
## U.S.

The growing gap between consumption and production in the U.S. is clearly shown in Figure A-4. When compared to Figure A-1 above, the importance of Canadian gas exports becomes even more evident. A surge in exports to Mexico in 1990 (Figure A-5) attracted considerable interest. Mexico's recession the following year and other issues resulted in declining shipments and the flat cross-border trade we see today.

**Figure A-4. U.S. Natural Gas Production, Consumption (tcf/year)**

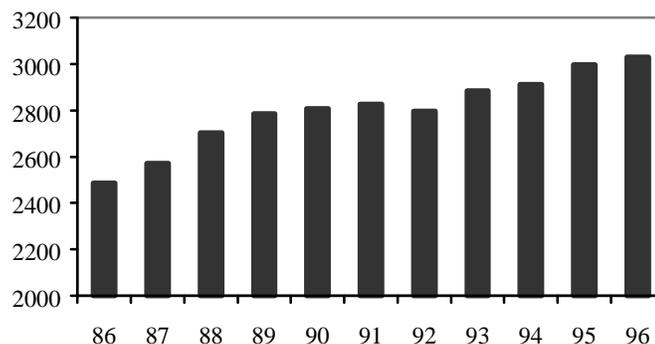


**Figure A-5. U.S. Natural Gas Exports, Imports (tcf/y)**



Net generation of electricity by utilities in the huge U.S. electricity markets is illustrated in Figure A-6.

**Figure A-6. U.S. Electricity Generation (billion kwh)**



In the U.S., heavily industrialized and urbanized areas in the Northeast, Midwest, Texas and California constitute the regions of highest energy use. The rapidly growing Southeast and Southwest regions represent the fastest growth in energy demand. The Northeast and upper Midwest exhibit marked winter season patterns for natural gas. Along with Eastern Canada, these regions have been the drivers for much of the long-line natural gas transmission capacity developed in the two countries. The Southeast and Southwest are characterized by strong summer season patterns for natural gas use, but mainly for peak power needs for cooling. In much of the mid-western, southeastern, southwestern and western U.S. coal is a dominant fuel for power generation. Substantial hydro capacity exists in the Northwest and West. Nuclear power, though a small percentage of overall electricity generation, is extensively distributed across the U.S.

The U.S. has a long and complex history of regulation and regulatory restructuring. The natural gas and electricity industries share many similarities in how regulation evolved as well as in strategies for transitioning to more competitive industries. The early gas industry was created to distributed town gas manufactured from coal. Discovery of natural gas in the eastern U.S. resulted in rapid conversion to that fuel. Competition was fierce as local distribution companies (LDCs) struggled to establish market areas, but profitability in the industry was low. Regulation was first established at the state level following key U.S. Supreme Court decisions that established the public interest concept. Discovery of huge natural gas resources in the southwestern U.S., emergence of the interstate pipeline industry and consequent disputes related to pricing natural gas in interstate transactions led to federal government involvement. Continued disputes in pricing and court decisions led to federal control of natural gas prices at the wellhead. This history is summarized in Table A-8.

**Table A-8. Evolution of Natural Gas Regulation in the U.S.<sup>183</sup>**

<b>Market Raiding Era</b>	Unregulated industry.	1870-1890
<b>State Public Utility Regulation Era</b>	Emergence of state public utility regulation following the Supreme Courts <i>Munn v. Illinois</i> decision in 1877 that established a separate category of businesses affected with a public interest to be regulated as public utilities. The Massachusetts Gas Commission, created in 1885, is generally thought to be the oldest of the state PUCs. Regulation of intrastate pipelines in all 48 states was achieved by 1927.	1885-1927

<b>Natural Gas Act (NGA) Era</b>	The Public Utility Holding Company Act in 1935 broke up the large holding companies and authorized the Federal Power Commission (FPC) to regulate the interstate transactions of electric utilities. The NGA in 1938 authorized the FPC to regulate interstate transactions of natural gas. Natural gas industry now comprehensively regulated from the burner tip to intrastate transmission to interstate transmission by state and federal jurisdictions.	1928-1938
<b>Supreme Court <i>Phillips</i> Decision</b>	Decision upholding a circuit ruling overturning the FPC in a test case on whether wellhead production constituted a natural gas activity affected with a public interest as defined in the NGA. Natural gas industry now regulated to the wellhead.	1954

The electric utility industry in the U.S. followed a course that strongly paralleled that for natural gas. Strong competition and low returns to shareholders as the early utilities were established laid the groundwork for government intervention. It is generally thought that Samuel Insull, Thomas Edison’s partner in the Bond Electric Company, first conceived of the idea that state public utility commissions should regulate the electric utilities. The development of interstate transmission for electricity also led to pricing conflicts. As noted in Table A-8, the PUHCA authorized the FPC to regulate interstate transactions. The Rural Electrification Act, also passed in 1935, encouraged the extension of electricity services outside of the profitable urban centers in the U.S.

From the 1950s to the 1970s, the U.S. natural gas industry was almost constantly in a state of flux and turmoil. Markets were difficult to build and regulation was fraught with difficulty (especially at the wellhead). By the 1970s, the added dilemma of worldwide energy crisis as a result of oil embargoes created an atmosphere of reform. The first stages of natural gas regulatory restructuring, however, were nearly as traumatic and damaging as regulatory control had been to that point, as Table A-9 demonstrates. The 1978 NGPA was nearly impossible to administer, implementing as it did numerous categories of natural gas while distorting producer’s decisions toward higher cost gas. The PIFUA and PURPA laws, passed at the same time, created a web of conflicting policy and regulatory signals that negatively impacted both the natural gas and electricity industries. As the FERC began to execute its open access orders and dismantle the merchant function of the interstate pipelines, take-or-pay provisions in supply contracts undermined the fiscal integrity of many pipelines and producers. In spite of these issues and their ramifications, the first winter season experience following FERC’s Order 636 saw record deliveries of natural gas with no curtailments. Marketing and trading operations have mushroomed, although at the present time profit margins are thin because of the intense competition. LDCs, generally able to pass transition costs on to their customers, have come under increasing competitive pressure while producers (plagued for many years after the NGPA by a persistent supply “bubble”) and pipelines have seen their revenues stabilize and increase. Nevertheless, the maturity of the U.S. market is such that the industry has become international in scope as firms take their expertise and experience from restructuring into emerging markets.

**Table A-9. U.S. Natural Gas Policy/Industry Restructuring<sup>184</sup>**

<b>Setting: system shortages and curtailments</b>	Inability of FPC to keep up with case-by-case, cost of service regulation of wellhead price controls and distortions created by price controls in the interstate markets relative to intrastate systems led to severe shortages and curtailments during a time of worldwide crisis in oil markets. Canadian producers and pipeline operators begin to build export capacity.	1970s
<b>Natural Gas Policy Act (NGPA)</b>	Phased incremental decontrol of federal wellhead prices in accordance with various categories of natural gas production and end use. FPC renamed Federal Energy Regulatory Commission.	1978
<i>Outcome</i>	Created complex system of pricing with distortions against higher cost supplemental natural gas sources and industrial consumers. The difficulty in administering the NGPA and enlarged federal authority over natural gas allocations resulted in greater inefficiencies in U.S. natural gas markets.	
<b>Powerplant and Industrial Fuel Use Act (PIFUA)</b>	Prohibited the use of natural gas in new electric utility boilers and some industrial boiler applications. Certain geographic areas excluded for air quality reasons.	1978
<i>Outcome</i>	Sharply limited the ability of the natural gas industry to expand markets at a critical time. Was based on misperceptions about the extent of the U.S. natural gas resource base.	
<b>Public Utility Regulatory Policy Act (PURPA)</b>	Created a category of Qualifying Facilities that could generate electricity free from PUHCA regulation. Utilities required to purchase power at avoided cost (cost that would be incurred if the utility were to build equivalent generation capacity)	1978
<i>Outcome</i>	PURPA allowed natural gas to re-enter the power market, and also facilitated development of generation using alternative fuels technologies. Purchased power from QFs would exceed (in some cases by large amounts) comparable market prices.	
<b>FERC Blanket Certificates and Special Marketing Programs (SMPs)</b>		1983-1985
<i>Blanket Certificates</i>	<ul style="list-style-type: none"> <li>• Enabled interstate pipelines to engage in transportation arrangements without prior approval (Section 7 certificate of public convenience and necessity) under NGA provisions.</li> <li>• Separate FERC rules for high priority end users (schools and hospitals), low priority boiler fuel users.</li> </ul>	
<i>SMPs</i>	<ul style="list-style-type: none"> <li>• Allowed interstates to release high cost gas under producer contracts for resale to industrial customers at market prices.</li> <li>• Blanket authorization by FERC to enable pipelines to</li> </ul>	

	<p>undertake abandonment, sales and transportation on self-implementing basis.</p> <ul style="list-style-type: none"> <li>Targeted interruptible customers with fuel-switching capacity.</li> </ul>	
<i>Outcome</i>	In the “natural gas revolution of 1985,” <i>Maryland People’s Counsel v. FERC (MPC I and MPC II)</i> SMPs and blanket certificates ruled unlawful as unduly discriminatory. <sup>185</sup>	
<b>FERC Order 380 and Related</b> <sup>186</sup>	<ul style="list-style-type: none"> <li>Eliminated all variable costs (primarily purchased gas) from interstates’ minimum bills charged to customers (LDCs and electrics). Reduced cost to customers of not taking gas by as much as 80 to 90 percent (interstates barred from passing through and recovering TOP payments to producers for gas not delivered based on FERC finding that in some cases minimum bills were overcharged).</li> <li>Gave pipeline customers freedom to purchase lower priced pipeline system gas released into special supply pools and available for bid in 30-day spot market, drastically reducing pipeline system sales.</li> <li>Did not eliminate TOP obligations by pipelines toward producers.</li> </ul>	1984
<i>Outcome</i>	<ul style="list-style-type: none"> <li>Affirmed in <i>Wisconsin Gas Co. v. FERC</i>.<sup>187</sup></li> <li>Expanded by <i>Transwestern V. FERC</i> to exclude all fixed costs from minimum bills.<sup>188</sup></li> <li>Creation of spot market that by 1985 constituted about one-third of national market.</li> <li>Concern that elimination of all fixed and variable costs would create supply and reliability problems for interstates, but with creation of spot market and demand for access by gas buyers and sellers, interstates revealed as the “bottleneck.”</li> </ul>	
<b>FERC Order on Modified Fixed Variable Rate Design (MFV)</b>	<ul style="list-style-type: none"> <li>Established in <i>Texas Eastern Transmission Corp.</i><sup>189</sup> Two part demand charge: 50 percent of fixed costs (minus the return on equity and related income taxes) recovered from peak-day demand charge; 50 percent recovered through annual demand charge.</li> <li>Variable costs allocated to commodity charge. Return on equity and related taxes recovered through commodity charge.</li> </ul>	1985

<i>Outcome</i>	Goal was to make natural gas more competitive against other fuels by reducing the proportion of fixed costs charged to high volume users. However, places greater proportion of fixed costs on lower volume but captive customers.	
<b>FERC Order 245</b>	<ul style="list-style-type: none"> <li>Established in <i>Abandonment of Sales and Purchases of Natural Gas under Expired, Terminated, or Modified Contracts</i>.<sup>190</sup></li> <li>New standards for considering applications for abandonment (under the NGA, market actors constrained from releasing gas for take by other customers or from abandoning contracts that are no longer socially beneficial by requirement of FERC authorization prior to release).</li> <li>Focus on effect of grant of abandonment on overall performance of gas market. Identified generic circumstances in which abandonment would be authorized. Reduced number of cases requiring hearings prior to grant of abandonment.</li> </ul>	1985
<i>Outcome</i>	Reduced market distortions by improving gas flows across markets.	
<b>FERC Order 436 and Related</b> <sup>191</sup>	<ul style="list-style-type: none"> <li>Open access strategy chosen by FERC rather than revision of SMP program. Superseded all special transportation programs established by FERC to correct market distortions. Established precedent for regulating transportation of natural gas with sales subject to market competition--unbundling of transportation rates and services.</li> <li>FERC stated that natural gas production was determined by Congress in NGPA to be workably competitive. Further stated that “as a result of physical and technological changes” natural gas can be transported throughout the continental U.S. and producers can market their natural gas in a national market while purchasers can obtain supplies from a variety of sources.<sup>192</sup></li> <li>Nondiscriminatory open access transportation on a first come-first served basis under both NGA Section 7 and NGPA Section 311 (although some firm customers, like LDCs, allowed to “bump” interruptible users); flexible receipt and delivery points; optional expedited construction/operations certificates; customer contract demand (CD) conversion/reduction option to firm transportation (essentially partial abrogation of gas purchase contracts, or pregranted abandonment); voluntary compliance, but pipelines that chose to comply would receive favorable treatment on TOP liabilities.</li> </ul>	1985

	<ul style="list-style-type: none"> <li>• Peak period rates to ration capacity; off-peak firm rates and interruptible rates to maximize throughput; pipeline revenue requirement allocated to firm and interruptible service attained by providing projected peak/off-peak units of service at the maximum rate for each service.</li> <li>• Reservation charges imposed on firm transportation can only recover fixed costs that would be recovered by using the ratemaking methodology employed to determine the demand charge. All other transportation rates to be one-part volumetric charges, allowed to vary only within prescribed range.</li> </ul>	
<i>Outcome</i>	<ul style="list-style-type: none"> <li>• Vacated and remanded in <i>Associated Gas Distributors v. FERC</i> on grounds that FERC had not justified CD reduction option and not adequately addressed TOP implications of open access.<sup>193</sup> However, court supported the contract carriage convention as within FERC's authority.</li> <li>• Created opening for entry of independent brokers into the industry.</li> </ul>	
<b>FERC Order 451 and Related</b> <sup>194</sup>	<ul style="list-style-type: none"> <li>• FERC moved to finally eliminate vintaging and the market distortions created by multiple categories of old gas. Abolished NGPA below-market price ceilings on old gas as no longer just and reasonable under NGA and established alternative maximum lawful price (MLP) equal to highest previous ceiling for any old interstate gas.</li> <li>• Provided for Good Faith Negotiation (GFN) to allow both high and low priced gas to reach market levels.</li> <li>• GFN required for acceptance of alternative MLP.</li> <li>• Also relied on GFN to help pipelines renegotiate problem contracts.</li> </ul>	1986
<i>Outcome</i>	Issues: complicated procedures, implications to producers may not be clear; new ceiling on old gas may create distortions later.	
<b>Congressional Repeal of NGPA Incremental Pricing</b> <sup>195</sup>	Superseded series of FERC orders since 1983, which had devised a method of implementation of NGPA provisions in order to reduce market distortions but which could not blunt full effect.	1987
<i>Outcome</i>	Long-overdue action, since gas surplus already underway. Designed to restore equilibrium, but gas prices not fully deregulated.	
<b>Congressional Repeal of FUA</b> <sup>196</sup>	Superseded exemptions issued by the U.S. DOE (as part of DOE's authorization under the FUA) since 1978, which attempted to nullify restrictions on natural gas use as a boiler fuel but which could not completely remove distorting effects.	1987

<i>Outcome</i>	Removal of a strong artificial constraint imposed on natural gas demand at a time when shortages were viewed to be a long-term phenomenon. Would allow the development of natural gas applications in competitive fuel markets.	
<b>FERC Order 500 (Interim Rule) and Related (except where Indicated)</b> <sup>197</sup>	<ul style="list-style-type: none"> <li>• FERC’s response to remand of Order 436. Reissued 436 with elimination of customer CD reduction option and creation of TOP recovery mechanism for already incurred liabilities.</li> <li>• TOP recovery for incurred liabilities either through (1)“equitable sharing”--pipeline could collect as much as it agreed to absorb itself, through demand charge levied on the basis of difference between each customer’s purchases during the deficiency period compared to customer’s purchases during base period, or through (2) “volumetric” remedy--pipeline could collect TOP surcharge on each unit of throughput, both transportation and sales.</li> <li>• Gas inventory charge (GIC) created to allow pipelines to recover future TOP charges; levied against customers to reserve availability of natural gas as a commodity (as opposed to minimum bills, levied in same way but in market in which there are alternative sellers). To charge a GIC, pipeline must be open access transporter; must not recover future TOP by any other means; must allow customers to nominate levels of service freely within their firm sales entitlements; prior to nominations announce a price to be held constant during the period when renominations are to be effective.</li> </ul>	1987
<i>Outcome</i>	Interim Order 500 remanded in <i>American Gas Association v. FERC (AGA I)</i> because of equitable sharing method which did not require advance notice to customers of charges they are to pay. <sup>198</sup>	
<b>FERC Order 490</b>	<ul style="list-style-type: none"> <li>• Allowed automatic, expedited abandonment of all first sales (i.e., producer sales) under NGA Section 7 certificate provisions upon 30 days’ notice when underlying contract either expired or was terminated by mutual consent of parties.</li> <li>• Required possession by pipelines of Order 426/500 certificate for abandonment.</li> </ul>	1988
<i>Outcome</i>	Help to promote shift to open access.	
<b>FERC Order 497</b>	<ul style="list-style-type: none"> <li>• Established strict codes of conduct for pipelines doing business with affiliated gas marketing companies to prevent preferential treatment.</li> <li>• Pipelines required to segregate transportation and spot gas activities.</li> </ul>	1988

<i>Outcome</i>	<ul style="list-style-type: none"> <li>Prevented attempts by interstate pipelines to avoid open access by setting up marketing affiliates.</li> <li>Alleviate new bottlenecks that had developed between independent gas marketers and pipeline marketing affiliates such that third party shippers did not have competitive access to interstate transportation.</li> <li>Raised questions about loss of efficiencies associated with vertical integration of interstate pipeline transportation and services (bundling).</li> </ul>	
<b>FERC Order on MFV Rate Design Changes</b> <sup>199</sup>	<ul style="list-style-type: none"> <li>Adopted MFV without “D2” charge. One-part demand charge. All fixed costs <i>except</i> the return on equity and related income taxes recovered through peak-day demand charge.</li> <li>Variable costs allocated to commodity charge. Return on equity and related taxes also recovered through commodity charge.</li> </ul>	1989
<i>Outcome</i>	<ul style="list-style-type: none"> <li>Achieved transitional rate design as open access progressed.</li> <li>Simplified rate design since low load customers no longer needed assistance with impact of shift in fixed costs to demand charge.</li> </ul>	
<b>FERC Order 500-H</b> <sup>200</sup>	Final order, issued in response to <i>AGA I</i> remand.	1989
<i>Outcome</i>	In <i>American Gas Distributors v. FERC (AGD II)</i> court finds that the purchase deficiency methodology for allocating directly billed fixed charges among pipeline customers violates the Filed Rate Doctrine and therefore vacates this aspect of Order 500. <sup>201</sup>	
<b>FERC Order 500-I</b> <sup>202</sup>	Reaffirmed equitable sharing mechanism in Order 500-H. Granted in part and denied in part rehearing of Order 500-H. Did not specifically affect TOP recovery mechanisms.	1990
<i>Outcome</i>	Court approves almost all aspects of orders 500-H and 500-I in <i>American Gas Association V. FERC (AGA II)</i> . <sup>203</sup> Defers judgment of purchase deficiency methodology to <i>AGD II</i> .	
<b>Wellhead Decontrol Act</b>	<ul style="list-style-type: none"> <li>Rep. Philip Sharp’s (D) surprise initiative to decontrol all remaining price-regulated gas (in spite of opposing position held by consuming state representatives).</li> <li>Amended both the price and non-price decontrol provisions of the NGPA to achieve complete deregulation of all first sales of gas. Full decontrol achieved by January 1993.</li> </ul>	1990
<i>Outcome</i>	Competitive market prices for first sales of natural gas since the <i>Phillips</i> decision.	

<b>FERC Order 528</b> <sup>204</sup>	Response to <i>AGD II</i> and <i>AGA II</i> . Eliminated retroactive component of equitable sharing mechanism which was on remand of Order 500. Stayed the TOP settlement recovery for certain pipeline companies. Some companies exempt from the stay because they and their customers had filed stipulation agreements with FERC in which all parties agreed that Order 500 fixed charge allocation mechanism would be used even if later modified by court. Provided means for companies affected by the stay to file new fixed charges that reflect a new allocation methodology that will satisfy the court and made suggestions for methodology.	1990
<i>Outcome</i>	Established open access and “regulated competition” <sup>205</sup> as the new norm for the industry.	
<b>FERC Order 636 and Related</b> <sup>206</sup>	<ul style="list-style-type: none"> <li>• “Restructuring Rule” to complete the process of transition to open access as specified in orders 436/500.</li> <li>• Major features: <ul style="list-style-type: none"> <li>• Pipelines must unbundle sales from transportation.</li> <li>• After compliance, pipelines may make sales at market based rates under blanket certificates.</li> <li>• Pipelines with bundled sales must offer “no-notice” transportation service after unbundling.</li> <li>• Open access transportation must entail comparable service to all shippers.</li> <li>• Storage is defined as “transportation” and must be offered as separate open access service.</li> <li>• Firm shippers must have access to upstream capacity held by pipeline.</li> <li>• Each pipeline must initiate capacity release program using its electronic bulletin board (EBB) so that firm customers may attempt to find users for unused firm capacity and customers desiring firm capacity may obtain it.</li> <li>• Straight fixed variable (SFV) rate design unless alternative approved by FERC. One part demand charge. All fixed costs recovered through peak-day demand charge. <i>Includes</i> return on equity, taxes, long-term debt. Variable costs allocated to commodity charge.</li> <li>• Pre-granted abandonment authority for sales, short-term firm transportation, interruptible transportation. Pipelines must offer right of first refusal to shippers as their long-term transportation agreements expire (establishes a secondary market for capacity).</li> <li>• Pipelines permitted to recover 100 percent of prudently incurred transition costs caused by</li> </ul> </li> </ul>	1992

	<p>compliance.</p> <ul style="list-style-type: none"> <li>• Procedure and timetables for full compliance by 1993-94 winter heating season.</li> <li>• Order 636-A changes and additions (8/3/92): <ul style="list-style-type: none"> <li>• Pipelines must continue one-part volumetric rates for unbundled transportation provided to small customers.</li> <li>• Pipelines encouraged to expand classification of small customers to include those with capacity of up to 10,000 mcf/d.</li> <li>• Pipelines must continue for one year from (date of implementation) to offer bundled sales at cost-based rates to small customers.</li> <li>• Pipelines must recover 10 percent of gas supply realignment transition costs via open access interruptible transportation rates.</li> <li>• Capacity releases of less than one month no longer required to be posted for bidding, but must be posted within 48 hours for informational purposes.</li> <li>• Continues SFV rate design but directs pipelines to develop mechanisms to address cost shift from high to low load factor customers.</li> </ul> </li> <li>• Order 636-B changes and additions (11/27/92): <ul style="list-style-type: none"> <li>• Denied further rehearing of 636 but clarified details. Reemphasized need to mitigate costs shifts from switch to SFV rate design.</li> </ul> </li> </ul>	
<p><i>Outcome</i></p>	<ul style="list-style-type: none"> <li>• Implemented but appealed in <i>Atlanta Gas Light Co. and Chattanooga Gas Co. et al. v. FERC</i>, Nos. 92-8782, D.C. Circuit Court (after motions to change venue from Eleventh Circuit Court in Atlanta). Approximately 100 petitions made up the appeal. The following issues were the most contentious. <ul style="list-style-type: none"> <li>• FERC's legal authority to order unbundling under NGA Section 7 provisions. Some pipelines oppose authority.</li> <li>• SFV rate design, opposed by LDCs, PUCs, consumer advocates. Could increase costs to low load customers.</li> <li>• Capacity release mechanism. Many LDCs and PUCs would prefer program in which pipelines are not involved, arguing that since pipelines control information they could manipulate the program.</li> <li>• 100 percent recovery by pipelines of transition costs. LDCs and PUCs argue that pipelines should absorb a portion of costs.</li> </ul> </li> <li>• The appeal was rejected by D.C. Circuit Court.</li> </ul>	

Regulatory restructuring for electricity has, thus far, followed a similar pathway to that for natural gas with the exception that the U.S. Congress, in passing the Energy Policy Act of 1992 (EPAct) created the window of opportunity. The EPAct established a new class of Exempt Wholesale Generators (EWGs) who could generate and sell electricity at market based rates free of PUHCA regulations. Utilities that own transmission facilities are required to provide access to EWGs on a comparable basis to the utilities' own generation facilities, and to furnish information on the availability of transmission capacity and constraints. Finally, under the EPAct the FERC allows utilities to sell their power at market-based rates so long as they provide transmission access. In response to actions by the CPUC, most aggressively, and the Michigan commission, the FERC advanced the case for open access on the U.S. transmission grid with its orders 888 and 889 in 1996. These orders closely follow Order 636 in principle, including the creation of electronic bulletin boards to increase transparency and encouragement of a secondary market for transmission capacity that might be held by shippers.

When the history of natural gas and electricity regulation and regulatory restructuring are reviewed, it becomes readily apparent that regulatory change, especially recently, is increasingly market-driven. The FERC would have never instituted Orders 436 and 636 if market forces had not existed to encourage new rules. If, as expected, natural gas and electricity restructuring in Canada and the U.S. lead to a greater competitive advantage, then it is likely that policy makers in other countries will "shop" for regulatory technologies that will make their industries more competitive as well.

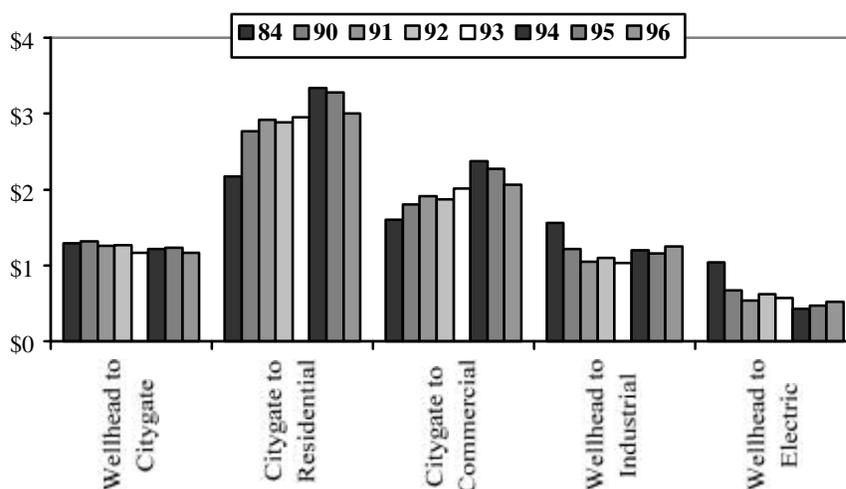
### ***Current Issues and Topics***

#### ***Natural Gas***

One of the most contentious issues related to implementation of Order 636 was transitions costs. The U.S. Government Accounting Office (GAO) estimated that 68.8 percent of the total \$3.3 billion would be attributed to realignment of gas contracts (modification or termination of existing contracts with producers, equivalent to take-or-pay), 14.6 percent or \$0.7 billion for unpaid gas supplies (unpaid balances that pipeline companies had sold to firm customers), 10.4 percent or \$0.5 billion for stranded equipment (equipment no longer needed), and 6.2 percent or \$0.3 billion for new equipment that will be needed (like improved meters and electronic bulletin boards which post pipeline capacities). The GAO estimated that changes in interstate pipeline rate design under Order 636 would shift about \$1.2 billion per year in pipeline fixed costs, or about 11 percent of the total, to LDCs and ultimately end users. Residential gas costs could increase by 9 percent while nonresidential costs could decrease by 7 percent, depending upon the ability and willingness of LDCs to pass costs on to industrial customers. Although the GAO's costs estimates were higher than the FERC's and the report countered the FERC's contention of measurable net benefits, the GAO affirmed that the efficiencies to be gained from restructuring were important to the long-term health of gas markets and the industry. Although the GAO declined to accept the FERC's estimates of benefits from Order 636, the GAO endorsed the restructuring rule lessening the concern that the courts might overturn the restructuring policy.<sup>207</sup>

Notably, residential and commercial natural gas service prices did increase with restructuring, a consequence of the lack of competition within the distribution segment (Figure A-7 below). As the GAO predicted, LDCs were easily able to shift transition costs to customers (citygate to residential and citygate to commercial). Evidence of competition since the early days of restructuring is indicated in the decline in natural gas prices since 1995, but additional competition in the LDC segment will be required before residential and commercial customers are able to fully benefit from the open access system. Producers were most acutely affected by the restructuring (wellhead to citygate, wellhead to industrial and wellhead to electric), but growing demand and ever increasing experience with market management are resulting in price gains to producers.

**Figure A-7. U.S. Natural Gas Price Variations Across Industry and Customer Segments**



The size and scope of the U.S. natural gas market increased several fold following implementation of Order 636. The impact of open access was estimated by Enron Corp. in 1992, as follows.

**Table A-10. Natural Gas Transactions, Pre- and Post-Open Access**

1980--THE MERCHANT MARKET	1991--THE OPEN ACCESS MARKET
3,450 producers x 24 pipelines x 4/year = 331,000	3,450 producers x 24 pipelines x 12/year = 993,000
24 pipelines x 90 LDCs x 4/year = 8,000	24 pipelines x 90 LDCs x 12/year = 26,000
	3,450 producers x 2,000 industrials = 6,900,000
	535 marketers x 5,350 deals = 2,838,000
<b>TOTAL TRANSACTIONS = 339,000</b>	<b>TOTAL TRANSACTIONS = 10,757,000</b>

Today, it is likely that the number of transactions are many tens of millions. While the growth in trading and marketing has been a signature event in the overall U.S. market, a number of other areas have garnered attention.

- The unleashing of competition has also squeezed profit margins and challenged existing views about natural gas market development. The result has been extensive merger and acquisition activity most notably among producers, interstate pipelines, utilities and among pipelines, gas utilities and electric utilities (see section below). Physical convergence of the natural gas and electricity industries is occurring as a result of these strategies. Mergers of regulated entities require FERC and PUC approvals in addition to incurring antitrust review.
- Volatile natural gas markets and the inherent risk associated with finding and exploiting natural gas in mature U.S. basins remain the key considerations for the producer segment. Much of the onshore, Lower 48 natural gas supply is trapped in challenging reservoirs that may be extremely “tight” or is associated with coal (coalbed methane).<sup>208</sup> Both types of reservoir require expensive engineering treatments in order to sustain commercial production. Since the evolution of the natural gas supply “bubble” following wellhead price decontrol, investors and operating companies have been leery of directing capital toward high-risk exploration wells. Most efforts are directed toward developing gas where it has been proven to exist in commercial quantities but is undeveloped. However, the lack of onshore exploration may be showing up in production

trends which hint at issues in replacement as the oldest fields begin to post sharp declines (onshore production accounts for about half of U.S. supply). The bulk of capital and technology deployment in the U.S. is directed toward the offshore province and principally to deepwater plays. However, vigorous discussion surrounds the levels of sustained gas flows that actually might be achieved from these projects, relative to prediction.

- The functioning of the secondary market for pipeline capacity was questioned during the severe winter of 1995-96. It appears that a “gray” market has emerged in which holders of excess pipeline capacity bundle that excess capacity with other services rather than turn capacity back to the market. These activities are not transparent and thus the extent of the gray market is difficult to ascertain. This significance of its existence lies in the ability of actors in the new marketplace to find ways around the ground rules established by the FERC.
- Pipeline capacity additions in the open access era have been meager, a testament to market discipline. Capacity improvements are targeted where advantages lie in price differentials. One example is expanded cross-border capacity to bring Canadian gas that is much lower priced than Henry Hub (the major futures contract trading point in the U.S., located in south Louisiana). A second is de-bottlenecking pipeline systems to provide access to gas produced in the U.S. Rocky Mountains which also has a price advantage relative to Henry Hub (from a consumer/marketer perspective).
- The FERC has moved to allow market-based transportation rates for interstate pipelines where competition can be demonstrated to exist. Debate continues to center on the determination of workable competition. However, with open access implemented the difficulty of pricing transportation services above the market has become clear.<sup>209</sup>
- Questions remain over state actions to encourage competition and market development. At least 15 states (California, New Jersey, Maryland, Iowa, New York, Pennsylvania, Ohio, Massachusetts, Michigan, Wisconsin, Washington, Florida, Wyoming, Minnesota and Delaware, in declining order of activism) are pursuing programs to encourage open access among their LDCs.<sup>210</sup> These programs vary, as they do in Canada, in extent with regard to core (residential) customers (indeed, only California, Iowa, New York and New Jersey have included this group). Also like Canada, it is typical that full unbundling is not being undertaken but rather some form of more flexible choice and pricing, available to the largest customers. Among gas producing states, particularly Texas and Louisiana, questions regarding competition in the intrastate pipeline and gathering segments (where the line is often blurred) are often raised but strong action is unlikely, at least in the near term. Interesting issues have also emerged relative to gathering and pipeline systems to land natural gas from offshore facilities. For the FERC and states, concerns exist over access to new systems linking deep water production in the U.S. Gulf of Mexico to the pipeline grid. For developers of these offshore systems the cost and breadth of pipeline requirements, while still in a state of flux, are such that a desire exists to re-coup front end costs as rapidly as possible while minimizing the chance that loads will underutilize capacity.

The status of restructuring among the American states is a flashpoint for federal-state relationships, as it is and will be for electricity. From time to time, and certainly with publication of its National Energy Strategy in 1991, the U.S. DOE has served to bind state and federal interests or to encourage policy adaptation at the state level. The DOE is not responsible for regulation and has very little influence over FERC decisions. The agency does have some power to constrain market forces. For example, it has authority over exports and imports of natural gas, and can offer environmental approval. However, the purpose of the DOE is not to offer dispute resolution nor regulate policy, but instead to provide technical assistance. Thus, efforts to integrate regulation among the states and the FERC have been unsuccessful. However, there has been some limited success for states to coordinate unbundling with the FERC, and the DOE has been involved in these efforts.

Should the DOE attempt to exert influence in the natural gas industries in more substantive ways, the industry would likely respond quite negatively. For the most part, producers would complain if the DOE had too much to say regarding the FERC's regulations. This is because in order to reassure investors, there must be an independent regulatory agency that provides some consistency and continuity. However, independence of a regulatory agency does not always provide for consistency. Therefore, the conundrum for the DOE, and its NAFTA partners, is how to support both the independence of the national regulatory body and policy and regulatory continuity.

### *Electricity*

The situation for electricity restructuring in the U.S. is highly variable. The FERC's actions further subjects the electricity industry to competition nationwide, but as in Canada the state PUCs have strong positions with regard to restructuring. By the end of 1997, the states of Arizona, California, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island and Vermont had customer choice programs (full restructuring to the retail level) in place. Most programs phase in customer choice over time. Thirty-eight states were in the process of debating customer choice (including Texas). However, this year has seen a number of setbacks. Failures in the Independent System Operator (ISO) software in California, designed to manage dispatch in the new competitive supply environment, has cooled expectations in that state and elsewhere. Challenges by consumer groups in Massachusetts to the restructuring law passed by the state legislature and a possible referendum have weakened progress. Nationwide, disputes about allocation of stranded costs are holding many programs back. The difficulties faced by the major power marketers in building strong customer profiles has slowed industry strategies, although mergers, acquisitions, alliances and joint ventures proceed apace. The "go slow" approach advocated by investor-owned utilities most vulnerable to stranded costs, while perhaps providing a more stable transition, also affords IOUs the opportunity to strengthen their market positions through their nonregulated affiliates. In the natural gas industry, mergers and acquisitions along with more flexible arrangements are being sought as utilities attempt to position in more competitive conditions. Finally, and more significantly, are questions about what, exactly, consumers will respond to in an environment where multiple choices are available, or whether consumers will indeed rise to the occasion and seek alternatives to their current electricity service. This is a particularly acute problem when it comes to retail choice programs.

Overall, though, while some portions of the FERC's orders 888/889 relative to regulatory jurisdiction and stranded costs upset state PUCs, commissioners appear to be making sincere efforts to cooperate. A great deal of experience has been gained from natural gas restructuring, albeit at a vastly lower transition costs (roughly \$3 billion as compared to estimates of \$200 billion for electricity). As with natural gas, contentious issues lie in the impact across customer groups of transition cost allocation. In all likelihood, core customers (residential and small commercial) will face initial price increases in many markets. The full impact of price adjustments and length of time required depends in large part upon the treatment of stranded costs. The GAO has not yet completed an evaluation of 888/889. Initiatives have been proposed in Congress, including one by the DOE, but serious legislative debate has not ensued (as of this writing). The DOE generally has assumed 100 percent recovery of stranded costs but court challenges likely will dictate resolution. At issue for the PUCs and FERC is recovery of investments deemed to be "prudent" at the time decisions were made. It has been argued that the FERC was responsible for take-or-pay costs during gas restructuring via inadequate application of Order 380.<sup>211</sup> If stranded costs for electricity restructuring are judged to be equivalent to take-or-pay costs incurred in natural gas restructuring, then 25 percent or more should be allocated to shareholders. If, however, stranded costs are deemed to be more like transition costs then shareholders are unlikely to shoulder any of the burden.

Initially, the advent of electricity restructuring in the U.S. was viewed with optimism by the natural gas industry. Indeed, the rapid growth in nonutility generation and the preponderance of natural gas (about 50 percent) in the NUG segment, as well as the convergence between these sectors, would support expectations of increased market share for gas in power generation. Several caveats exist, however, as always. One is the extent and timing of baseload turnover. As coal and nuclear power plants are phased out either because they have reached the end of useful service or for other reasons (pollution abatement, for example) anticipation will be high that natural gas can make serious incursions. Great uncertainty exists in how this process will unfold. Fuel competition in the power generation segment is intense. Gas is generally the “marginal fuel,” being more expensive than coal on a Btu basis and thus typically used for peak demand periods. In fact, with trading and hedging, prices of all fuels on a Btu basis have converged. This means that gas providers must offer additional advantages in order to win in the power generation game.

### *International Trade*

With established and growing exports of natural gas from Canada a fact of life in the U.S. market, and given the size and maturity of U.S. markets on the whole, many producers and business developers have pinned their hopes on trade with and investment in Mexico. Expectations regarding natural gas trade with Mexico have waxed and waned since 1990 when an abrupt increase in imports by Mexico attracted attention. The CRE and SE view gas imports to be a viable point of competition in the Mexican market. Pemex has maintained consistently through the years that it will be able to meet growing demand in Mexico, and has made moves to increase development of northern gas fields and major southern basins in order to sustain production. Our outlook regarding the potential for exports to Mexico has always been sanguine.<sup>212</sup> For U.S. exports to Mexico to become a sustained, viable point of trade, the following conditions are necessary.

- Pemex, in contrast to its state position, would not meet capital investment and, consequently, production targets. Should world oil prices remain low for a prolonged period, this could be a distinct possibility.
- Demand in Mexico must increase substantially.
  - Industrial demand is likely to continue to increase if Mexico’s economy remains relatively stable and Mexico’s major industrial groups are able to continue to develop global export markets for their goods.
  - Demand in the electricity sector will be derived by both gas-fired nonutility generation and conversion from fuel oil to gas among the CFE’s facilities. The first instance is already allowed under Mexico’s 1993 electricity regulations (see below). For fuel oil conversions to occur, however, Pemex will have to move forward with downstream investments in order to reduce the amount of resid its refineries produce and thus must be placed in the domestic market. Pemex’s downstream investment programs are already suffering in the current climate of low oil prices, as mentioned in Part IV of our report. Or, Pemex will have to find external markets for its fuel oil, an unlikely event. Some hoped-for encouragement in the form of implementation of environmental rules that would affect fuel oil-fired power generation appears, as noted in Part IV, to have been delayed.
  - Finally, widespread conversion to natural gas from LPG (liquified petroleum gas) for domestic (residential) use and commercial applications is the third leg of demand growth in Mexico that could be met with U.S. exports. Most of the new LDC franchises in Mexico carry requirements for residential and commercial load development. However, with no winter heating market and little summer air conditioning capacity residential and commercial loads probably will not add substantially to natural gas demand growth.<sup>213</sup>

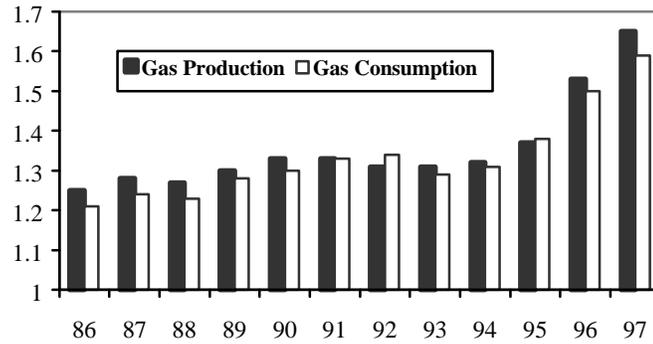
New pipeline projects, should market conditions support these ventures, and LDC franchises can easily import natural gas from the U.S. under the CRE's rules. However, imported gas must be able to compete with Pemex's own production on a cost basis, which is problematic. A sore point for U.S. interests is the extended phase out in NAFTA of Mexico's tariff on imported gas. Many arguments have been made to the effect that this tariff (currently at 5 percent) is a barrier to trade, but Pemex's low finding cost (most of Mexico's natural gas production is associated with crude oil) is a comparative advantage.

On the electricity front, U.S. developers and marketers must deal with Canada's Crown corporations, a difficult enterprise. The limited restructuring of Ontario Hydro will prolong the difficulty for both Canadian and U.S. entrepreneurs in entering that provincial market. HydroQuebec's plans to increase exports will be a bane to both U.S. developers (and Ontario Hydro next door). More interesting is the possibility for wheeling electricity into Mexico. A recent FERC decision supports wheeling on the U.S. side,<sup>214</sup> but the official position in Mexico is that FERC rules do not apply there nor is Mexico subject to the NAFTA on this issue. The potential for expanding electricity imports to Mexico would change the equation for natural gas in Mexico considerably, reducing the need for new gas-fired generation. While it has stated publicly that it supports wheeling, action has not followed words and thus the CFE is a constraint to any aggressive plan to ship power into Mexico. This could change with a serious effort to restructure Mexico's electricity sector. Finally, an interesting case would be the outright acquisition of a U.S. utility on or near the U.S.-Mexico border by the CFE. This notion was introduced during our study but never acted upon. In such a situation, the FERC would be involved as well as the PUC of the home state.

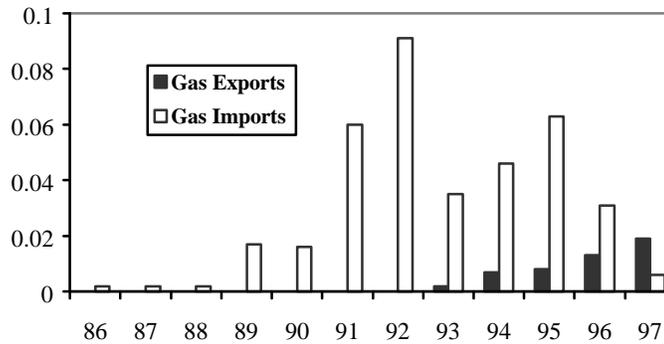
## **Mexico**

Investments and improved management processes resulted in gas production increases in Mexico during the past two years (Figure A-8). Pemex has also increased its exports of natural gas slightly (Figure A-9). During the winter of 1996, Pemex attempted to place more substantial quantities of gas into U.S. markets, but pipeline bottlenecks in south Texas curtailed that strategy. Turnover in contracts for firm capacity on pipeline systems in that region present an opportunity to Pemex to position its gas more attractively, if Pemex chooses to follow that course. Mexico's electricity generation is shown in Figure A-10. If Mexico's output is compared to that of the U.S. and Canada, one can observe that growth in electricity generation in Mexico continued unabated through two sharp, deep recessions (1992 and 1995 following the currency devaluation). In both the U.S. and Canada, as well as other industrial countries, electricity production varies with overall macroeconomic conditions. The data in Figure A-10 therefore reflect the aberration in Mexico electricity compared to its NAFTA partners – high nontechnical losses associated with theft and nonpayment appear to be creating artificial demand conditions for electricity. Any effort to reduce the inefficiency in Mexico's electricity sector will most certainly impact the outlook for demand.

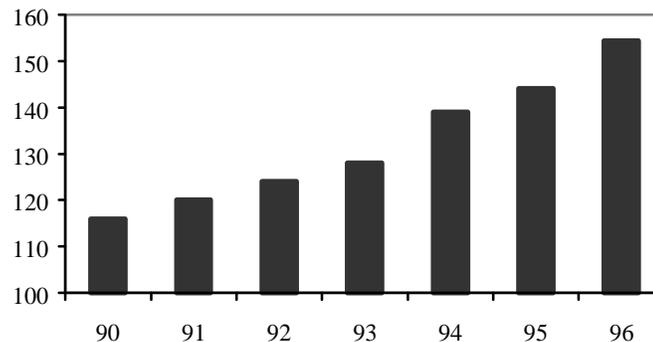
**Figure A-8. Mexico Natural Gas Production, Consumption (tcf/year)**



**Figure A-9. Mexican Natural Gas Exports, Imports (tcf/y)**



**Figure A-10. Mexico Generation of Electricity (gwh)**



In Mexico, most energy consumption occurs in the central states, particularly around Mexico's large urban areas in Mexico City and Guadalajara. The fastest growing energy demand is in Mexico's northeast states, where Monterrey and border cities like Juarez are outpacing the rest of the country in industrial and economic development. The principal domestic fuels are LPG (mainly propane and butane). These are used for cooking and space heating, and are also extensively used in small to medium commercial establishments like hotels and restaurants. Except for some areas, like Chihuahua, winter season heating peaks in Mexico do not exist. In addition, air conditioning is not commonly used except in the newest and most modern commercial buildings and homes. About 70 percent of Mexico's electricity is produced from thermal plants that use mainly fuel oil with some coal. As shown in Table A-1, Mexico's reliance on natural gas already is on a par with that in the U.S. Mexico has one large nuclear power plant at Laguna Verde that provides four percent of

generation. Hydro capacity accounts for about 25 percent of electricity production and is heavily influenced by seasonal rain patterns.

Mexico's energy sector is closely identified with the political coalition that has controlled the nation's government and economy for more than 60 years. Many theories exist about the link between energy and political power in Mexico, but it is most probable that nationalizing Pemex in 1938 gave then President Lazaro Cardenas control not only of Mexico's resource wealth but a way to bind Mexico's powerful families and industrial groups, mitigate labor unrest and deal with the world industrial powers, particularly the U.S. Of the Latin American nations, Mexico has perhaps the most onerous constraints to private investment in energy development. In the past three years, however, significant steps have been taken to create opportunities where none existed before (Table A-11). Although Mexico took initiatives for electricity prior to instituting changes in natural gas, unclear requirements for pricing electricity purchased from independent power producers by the CFE and for contracting for gas from Pemex hampered investors. New clarifications should alleviate the difficulties somewhat. The jury is out on the ultimate success of Mexico's strategies, though, because Pemex and CFE remain intact and able to wield great influence with their major customers. While these groups have pushed for better quality of service and more favorable energy prices, and will continue to do so, they will not easily abandon their relationships with Mexico's national energy companies.

**Table A-11. Mexico's Electricity and Natural Gas Policy/Industry Restructuring**

<b>Original Articles 27 &amp; 28 of Mexico's Political Constitution (1938)</b>	Established the Nation's exclusive right to exploit hydrocarbons, provide public electric power service, and manage nuclear fuels and other activities.
<b>NAFTA</b>	NAFTA fully recognizes the constitution on Mexico and its prohibition of foreign ownership of Mexican oil reserves. NAFTA does build on GATT disciplines in that a country may not set restrictions on energy trade.
<b>1992, Amendment of Article 3 of the Electrical Energy Public Service Law</b>	Allows for foreign and national participation in electrical generation in the areas of self-supply, power sold to the CFE, power to be exported, and power for emergencies. The Amendment also provides for importation for self-use. This is done by removing the above activities from the definition of public service as defined in the constitution.
<b>1993, Greenfield Power Act</b>	Creates Mexico's federal Energy Regulatory Commission, the CRE, as a part of the Energy Ministry.
<b>1995, Amendment of Article 27 of the Mexican Constitution</b>	Gas transportation storage and distribution may now be carried out, under permit by the social and private sectors, which may build, operate, and own pipelines, installations, and equipment within the terms of the regulatory and technical provisions issued.

<b>October 31, 1995, The Energy Regulatory Act</b>	Increases the CRE's authority. The CRE now implements regulations for the gas industry and is an independent agency of the Energy Ministry.
<b>November 8, 1995, The Natural Gas Act</b>	To coincide with industry reform the Act sets out provisions for Pemex and private company participation in the Gas industry.

### ***Current Issues and Topics***

#### *Natural Gas*

Mexico has a great many needs when it comes to developing its natural gas sector, but one of those may be a gas hub. A hub and market center in northern Mexico would facilitate transparency in prices of imports from the U.S. (or Canada, via backhauling) and cost differentials across Pemex's basins as well as transportation price differentials. The fear in Mexico is that a northern hub would be too easily controlled by Pemex. However, the current situation of subjecting Mexican consumers fully to price movements in the U.S. (since the CRE's rules use price formulas for imported gas linked to the Houston Ship Channel) is not desirable either. Risk management can mitigate some of this exposure, but eventually Mexico will need a market center if the natural gas industries are to develop to their fullest extent.

The CRE's strategy of relying on imports to induce competition hinges on access to the Pemex pipeline system. Reliable information on how (and when) open access will be a reality in Mexico is essential. Regardless, auctions of LDC systems have proceeded apace. Franchises have been awarded for Mexicali, Chihuahua, Toluca, Hermasillo, Tampico and Monterrey, though not all bid processes have been handled evenly. On the deck are the two zones in Mexico City, considered both a prize and a daunting challenge to intrepid investors. Every franchise will require major overhauling and upgrading, including everything from modern metering systems to replacement of corroded pipe. While revenue capture from industrial and large commercial customers is most realistic, developing a revenue base among residential and small commercial users remains doubtful. While core customer response in franchise areas near the U.S. border have been encouraging, with customers willing to pay slightly higher prices for improved and more reliable service and modern infrastructure, extending service deeper into Mexico will be a challenge. The cost to hook up residential customers is \$300-400 per household. With an average monthly domestic fuel bill of just over \$6.00,<sup>215</sup> this means a long period of time before investors will recover their initial investments. A major uncertainty in building internal markets for gas in Mexico is the demand cycle. There is no guarantee that if supply increases, demand will also increase. Data and information to fully support new investments is often unreliable so that bids submitted for LDC franchises often reflect more of an entry strategy, "loss leaders" rather than projects that can stand alone.

While the new regulatory regime for natural gas in particular represents an important step forward, there are many questions left unanswered about what the next step for Mexico will be. Furthermore, it is difficult to discern the vision for Mexico's regulatory regime, given the legal status of Pemex. Privatization of Pemex is simply not politically feasible. With no prospect of an opening in Mexico's upstream, will the new regulatory regime diminish Pemex revenues to the detriment of Mexico? What of Pemex's self-determination? It is clear that Pemex should be separated from the national budget. As long as this link exists, Pemex's capital requirements will constantly be subject to Mexico's fiscal uncertainties. (In spite of resolutions following the 1994 peso devaluation, it appears at this time of heightening presidential election politics that fiscal discipline in Mexico is in no better

shape than during the period leading up to the December 1994 crisis). The IMF considers Pemex to be a part of the government's budget, affecting Mexico's status with the agency. Apart from self-determination for Pemex, the company has an imperative to continue streamlining and instilling competitive fervor among its managers. Proprietary technology (both upstream and downstream) is one of the most important advantages in entering markets worldwide, but managerial resistance to implementing new technologies and approaches is widespread in both Pemex and the CFE.

### *Electricity*

After a prolonged period of highly visible indecision, ground was broken on the large gas-fired power project at Samalayuca last year. Located near Juarez, the 250 megawatt unit will cost \$700 million in a build-lease-transfer scheme that returns ownership and control of the facility to the CFE. Another highly visible 250-MW unit at Merida was awarded last year. A 700-km gas pipeline will be required for that project. The Merida power plant will be constructed and operated by a private consortium as the first true IPP project in Mexico. Both of these plants are part of the CFE's plan for capacity additions to 2001. Apart from major generation facilities, a handful of the approximately 80 industrial projects involving cogeneration or generation for self-use permitted by the CRE are under development.

Mexican officials have long advertised that the country requires six gigawatts of new electricity capacity by the early part of the next century. But this forecast is subject to considerable scrutiny considering how Mexico's electricity sector has been operated thus far. Moreover, subsidies to electricity consumers are such that no other company could possibly compete with the CFE. The residential price for power in Mexico is now about 2¢/kwh compared to an estimated 4¢ if subsidies were fully dismantled. The industrial price is about 5¢, closer to U.S. prices. The consequence is that, industries, along with taxpayers, subsidize the residential sector. Electricity subsidies constitute approximately 50 percent of the government's budget, a serious problem for Mexico. Such a policy is unsustainable, but serious action is yet to be taken toward resolution.

### *International Trade*

The official position in Mexico is that the removal of tariffs on natural gas imports will not be accelerated. Thus, for the foreseeable future, barriers to free trade and competition now in place will continue to block moves toward a NAFTA-wide open and integrated market. At some point, Mexico's need for foreign investment, a high level of public sector debt and requirements for technological improvements will render Mexico's move to join the global market inevitable.

As emphasized in our report, regional patterns along the U.S.-Mexico border offer the greatest potential to the development of thriving cross-border trade and gas/electricity integration. Pemex has no comparative advantage in northwestern Mexico, so the expectation is for a healthy cross-border market to evolve. In the northeast, Pemex does and probably will continue to retain a strong comparative advantage that investors must learn to deal with. Pemex could be an important participant in U.S. gas markets with proper positioning. A risk is that a vigorous Pemex in U.S. markets might pose potential new sources of conflict if U.S. and Canadian energy interests detect a lack of reciprocal opportunity in Mexico.

While there is reason to be optimistic regarding cross-border electricity trade, roadblocks abound on the Mexican side. Inadequate infrastructure and resistance within the CFE will stretch out the process of establishing integration.

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## ENDNOTES

### Executive Summary

<sup>1</sup> When Mexico began the process of opening its natural gas sector, a one-day workshop on natural gas regulation was held on May 31, 1995 at the University of Houston by the Energy Institute, at the request of the U.S. DOE. Attending were the newly appointed regulators from the CRE and their counterparts from NEB and the FERC; officials from U.S. DOE, NRCan and SE; and officials from provincial and state regulatory agencies in the U.S.

<sup>2</sup> See Michot Foss and Johnson, 1991; Michot Foss, Garcia and Johnson, 1993; Michot Foss 1993, 1994, 1995, 1996.

<sup>3</sup> The concept of experimentation in the Mexico-U.S. border region is attributed to Dr. Jesus Reyes-Heróles, Secretary of Energy for Mexico during the time of this study.

<sup>4</sup> We borrowed this concept from Leebron (1996), an intriguing way of considering regulatory institutions within the context of cross-jurisdictional trade.

<sup>5</sup> After Joskow (1973).

### Final Technical Report

<sup>6</sup> When Mexico began the process of opening its natural gas sector, a one-day workshop on natural gas regulation was held on May 31, 1995 at the University of Houston by the Energy Institute, at the request of the U.S. DOE. Attending were the newly appointed regulators from the CRE and their counterparts from NEB and the FERC; officials from U.S. DOE, NRCan and SE; and officials from provincial and state regulatory agencies in the U.S.

<sup>7</sup> Much of the information for this section was adapted from Conine (1992).

<sup>8</sup> The first gas trade between Mexico and the U.S. began in 1929. The transaction involved gas that was exported from the United States into the Monterrey region of Mexico under private contracts through a pipeline constructed by United Gas Pipeline Company and distributed through Compania Mexicana de Gas, S.A., a wholly owned subsidiary of the American pipeline company. By 1942, over 10 bcf of gas per year were being delivered under this arrangement. As late as 1963, 394 miles of private pipeline with a daily capacity of over 115 mmcf were in operation in northern Mexico. *Id.* at 155, Table 36.

<sup>9</sup> Although Pemex had been granted exclusive transportation rights for hydrocarbons, private transmission was authorized under Ley Reglamentaria del Artículo 27 Constitucional en el Ramo de Petróleo, in 15 Legislación Petrolera: Leyes, Decretos y Disposiciones Administrativas Referentes a la Industria del Petróleo 51 (1925) (as amended on May 3, 1941) [hereinafter Ley Reglamentaria del Artículo 27].

<sup>10</sup> Stern (1985, 68); Bullard (1968, 196); Tussing and Barlow (1984, 150).

<sup>11</sup> *In re* Reynosa Pipe Line Co., 4 F.P.C. 282 (May 8, 1945).

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<sup>12</sup> Despite a meager exploration program in its early years and during World War II, Pemex had discovered the Mission field in northeast Mexico in 1945.

<sup>13</sup> In re Reynosa Pipe Line Co., 5 F.P.C. 130 (June 6, 1946). Concurrently, the FPC approved the continued sales by United Gas Pipe Line but capped its daily deliveries at 31.275 mmcf. United Gas Pipe Line Co., 5 F.P.C. 553 (June 6, 1946).

<sup>14</sup> It might be noted that the Texas Railroad Commission opposed the Mexican sales, arguing that Texas gas should be saved for Texas industry. For additional details on these early developments and an exhaustive study of the Mexican gas industry through the mid-1960's, see note 24.

<sup>15</sup> By 1980, the U.S. was importing 2.4 bcf/d, or 5 percent of its gas from Canada. Projections by the U.S. Comptroller General indicated that by 2000 the nation would be importing 15 bcf/d and 50 percent of its gas needs.

<sup>16</sup> Mexico boasted 100 tcf of gas reserves in 1980 (Grayson, 1980, 183). Some reports noted that there were 150 structures that could be similar to the Reforma fields and speculated that potential gas reserves totaled 195 tcf. Later figures reveal that in reality the country had only about 65 tcf of proven reserves at that time. Proven reserves peaked at 77 tcf in 1983.

<sup>17</sup> Two-thirds of this production was associated gas that had to be produced if the country's oil wells were to continue to provide sufficient quantities to meet domestic and export needs.

<sup>18</sup> The company was a Delaware closed corporation owned by Tennessee Gas Transmission Company (37.5 percent), Texas Eastern Transmission Corp. (27.5 percent), El Paso Natural Gas Co. (15 percent), Transcontinental Gas Pipeline Corp. (10 percent), Southern Natural Gas Co. (6.5 percent) and Florida Gas Transmission Co. (3.5 percent).

<sup>19</sup> The pipeline was designed to run north from Cactus up the Gulf Coast for 685 miles to San Fernando, where it would split with one branch to Monterrey and the other to Reynosa (Stern, 1985, 69). Financing of the pipeline required agreement from the International Monetary Fund that \$1 billion of financial credits necessary to construction would not count against the \$3 billion debt restriction imposed on Mexico in 1977 (Grayson, 1980 189).

<sup>20</sup> The apparent thinking was that Mexico could convert its own industrial base from oil to gas, freeing oil for export at world prices. If the gas were exported instead, it should be sold at parity with oil to give Mexico the same advantage it could otherwise obtain. Laura Randall, *The Political Economy of Mexican Oil* 176 (1989).

<sup>21</sup> Ebinger (1986).

<sup>22</sup> In meetings during the spring and summer of 1977, before execution of the Memorandum of Intentions, U.S. Energy officials had informed the Mexican authorities of the approval requirements and had questioned the advisability of using No. 2 fuel oil as the benchmark (Grayson, 1980, 193-94).

<sup>23</sup> Dept. of Energy Authorizations (Fiscal Years 1979 and 1980) and Energy Emergency Preparedness: Hearings on H.R. 1004 before the Subcomm. on Energy and Power of the House Comm. on Interstate and Foreign Commerce, 96th Cong., 1st Sess. 209 (1979) (statement of Harry E. Bergold, Jr., Asst. Sec. for Int'l Affairs of D.O.E.).

<sup>24</sup> Stern (1985, 72); Grayson (1980, 169). The pipeline was ultimately constructed with an import loan of \$1.2 billion from an international consortium of 113 banks (Margain, 1980, 455).

<sup>25</sup> See Grayson (1980, 195-96). In a reference to the plight of the gas talks, Pres. Portillo publicly commented to Pres. Carter during his 1979 visit to Mexico that "[a]mong permanent, not casual

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neighbors, surprise moves and sudden deceit or abuse are poisonous fruits that sooner or later have a reverse effect." *Id.* at 167.

<sup>26</sup> The rejection of the proposed price, together with remarks by some U.S. Congressmen to the effect that if the U.S. were to wait, Mexico would have to sell to the U.S. at reduced prices, ignited further opposition to the sale in Mexico on nationalistic grounds (Ebinger, 1986, 255-56). Another source attributes the offensive remarks to the Secretary of Energy (Stern, 1985, 73-4). At the same time, Mexico may have over estimated the severity of the U.S. gas shortage and assumed the gas would be purchased at any price (Stern, 1985 71).

<sup>27</sup> Grayson (1980, 196). The gas was sold on the Mexican market for \$.032 mmBtu (Ebinger, 1986, 256).

<sup>28</sup> Stern (1985, 76).

<sup>29</sup> Agreement on Natural Gas Trade, Sept. 21, 1979, United States-Mexico, T.I.A.S. No. 9657. This opportunity, too, was endangered by Mexican reaction to comments by U.S. officials concerning damages resulting from the Ixtoc I oil spill (Grayson, 1980, 168-69).

<sup>30</sup> For an analysis of whether the agreement favored either party, see Stern (1985, 67-68).

<sup>31</sup> Most of the terms in the contract were typical of those in most gas purchase contracts of the time, including provisions on price, price redetermination, delivery and purchase obligations complete with take-or-pay requirements, point of delivery, quality and measurement requirements and force majeure, with adjustments to allow for the international nature of the transaction. Delivery quantities were limited by Mexican national supplies remaining after satisfaction of Mexican domestic demand, Mexican law governed the transaction and disputes were subject to the Rules of Conciliation and Arbitration of the International Chamber of Commerce. The contract could be prematurely terminated by the decision of either government, by failure of a party to apply for necessary permits and by failure of a public agency to issue requested resale permits or to approve a price change.

<sup>32</sup> DOE/ERA Op. No. 12, Border Gas, Inc., Docket No. 79-31-NG (Dec. 29, 1979). The agreement between the U.S. and Mexican governments is referred to herein as the "Border Gas Agreement."

<sup>33</sup> The increase, which effectively set the price of gas at the equivalent price of imported crude oil, was reluctantly approved the next month by U.S. authorities. DOE/ERA Op. No. 14, Inter-City Minnesota Pipeline Ltd., 1 E.R.A. ¶ 70,502 (CCH En. Mgt., Feb. 16, 1980). See also DOE/ERA Op. No. 23, Montana Power Co., 1 E.R.A. ¶ 70,522 (CCH En. Mgt., Oct. 23, 1980); DOE/ERA Op. No. 24, Transcontinental Pipe Line Corp., 1 E.R.A. ¶ 70,523 (CCH En. Mgt., Oct. 31, 1980).

<sup>34</sup> DOE/ERA Op. No. 16, Border Gas, Inc., Docket No. 79-31-NG (Mar. 26, 1980). While the ERA refused to grant blanket authority for increases in Mexican prices each time Canadian prices rose, it recognized the value of uniform pricing and regularly granted Border Gas applications for price adjustments every time Canadian increases were granted. See, e.g., DOE/ERA Op. No. 31, Border Gas, Inc., Docket No. 81-23-NG (April 21, 1981).

<sup>35</sup> Banks (1987, 73).

<sup>36</sup> Ebinger (1986, 96). This seems to have been justified by a rising demand for gas in Mexico's domestic market (Banks, 1987, 101; Snoeck, 1988, 367). Whether this was a wise policy has been disputed by at least one source (Stern, 1985, 79). The subsequent further reductions in the U.S. market price, however, seem to justify the cancellation in retrospect.

<sup>37</sup> Prieto and Marquez (1988, 318-319).

<sup>38</sup> The contemporary events included a controversy over the government's exercise over powers of eminent domain in obtaining the right-of-way for the pipeline, the Ixtoc I blow out in the Bay of

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Campeche and social-economic problems generated by the rapid development of oil fields in the southern part of the country (Williams, 1981, 8-10).

<sup>39</sup> Stern (1985, 80).

<sup>40</sup> Williams (1981, 3-16). It also has been argued from the U.S. perspective that the final contract was the right transaction for the wrong reasons; that a requirement for the U.S. to take the larger volumes envisioned in the original contract would have made it much harder for the U.S. companies to escape their contractual commitments upon the collapse of the natural gas market in the mid-1980's and would have further worsened diplomatic relations between the countries (Stern, 1985, 80).

<sup>41</sup> On a few occasions, the U.S. has examined the effect a proposed gas export will have in the foreign energy market. See Reynosa Pipe Line Co., 4 F.P.C. 282 (May 8, 1945), and Columbia Gas Transmission Corp., 57 F.P.C. 252 (Jan. 18, 1977). But see also Tennessee Gas Transmission Co., 12 F.P.C. 311 (Sept. 1, 1953).

<sup>42</sup> See, e.g., United Gas Pipe Line Co., 2 F.P.C. 775 (June 25, 1940) (authority terminates with contract); Border Pipe Line Co., 3 F.P.C. 827 (Oct. 10, 1942) (authority terminates after 5 years or upon end of war emergency, whichever is the last to occur); United Gas Corp., 4 F.P.C. 840 (Jan. 26, 1945) (terminates with present permit).

<sup>43</sup>See, e.g., Panhandle Eastern Pipe Line Co., 33 F.P.C. 180 (Feb. 4, 1965); United Gas Pipe Line Co., 5 F.P.C. 553 (June 6, 1946).

<sup>44</sup> See, e.g., Treasure State Pipe Line Co., 11 F.P.C. 1448 (Nov. 19, 1952). One version of this limitation precludes any international deliveries during the winter heating season extending from November to March and requires curtailment at any time the gas is needed to insure deliveries to U.S. consumers. See, e.g., Panhandle Eastern Pipe Line Co., 5 F.P.C. 472 (April 23, 1946); In re Reynosa Pipe Line Co., 5 F.P.C. 130 (June 6, 1946).

Additionally, the President has the authority under Section 103 of the Energy Policy and Conservation Act to restrict the export of natural gas, subject to exemptions the President should devise in the national interest. 42 U.S.C.A. § 6212 (1983).

<sup>45</sup> See Treasure State Pipe Line Co., 13 F.P.C. 1447 (Oct. 18, 1954); In re Panhandle Eastern Pipe Line Co., 15 F.P.C. 46 (June 30, 1956), aff'd sub nom. Michigan Consol. Gas Co. v. FPC, 246 F.2d 904 (3d Cir. 1957), cert. denied, 355 U.S. 894 (1957). Moreover, the U.S. Agency has always maintained that it has continuing jurisdiction over the transaction and can amend the import authorization at any time. Midwestern Gas Transmission Co., 56 F.P.C. 3777 (Dec. 27, 1976).

<sup>46</sup> Valero Gas Transmission Co., 1 E.R.A. ¶ 70,575 (CCH En. Mgt. Nov. 28, 1984).

<sup>47</sup> Yukon Pacific Corp., 1 E.R.A. ¶ 70,259 at 71,129 (Nov. 16, 1989).

<sup>48</sup> To estimate demand the U.S. Agency has accepted projections from the DOE's Office of Policy, Planning and Analysis, the Gas Research Institute and the American Gas Association. Id. at 71,130-31.

<sup>49</sup> Demand projections by the DOE's Office of Policy, Planning and Analysis, the Potential Gas Committee of the University of Colorado School of Mines and the U.S. Geological Survey. The U.S. Agency has taken the position that the projections should include or be adjusted to include expected reserve additions and gas from unconventional sources such as tight sands and coal sands despite the additional uncertainty involved in order to obtain a realistic assessment of future supplies. The U.S. Agency has also recently taken the position that potential imports can be included in the calculation of domestic supplies. Id. at 71,132-34. The recent surplus has allowed the DOE to find U.S. gas reserves to be adequate to meet consumer demand, particularly when exports are short term and

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market responsive. See, e.g., Tristar Gas Marketing Co., 1 F.E. ¶ 70, 695 (CCH En. Mgt. Nov. 19, 1992).

<sup>50</sup> See, e.g., Tennessee Gas Transmission Co., 12 F.P.C. 311 (Sept. 1, 1953); Lopeno Gas Co., 9 F.P.C. 1317 (Dec. 12, 1950); United Gas Pipe Line Co., 5 F.P.C. 553 (June 6, 1946); United Gas Pipe Line Co., 2 F.P.C. 775 (June 25, 1940).

<sup>51</sup> It has been recognized that a consideration in every case is the effect of gas imports on the domestic industry. Pacific Gas Transmission Co., 35 F.P.C. 1003 (June 15, 1966), petition for review denied sub nom., Calf. Gas Producers Ass'n v. FPC, 383 F.2d 645 (9th Cir. 1967); American Louisiana Pipe Line Co., 20 F.P.C. 575 (Oct. 31, 1958).

<sup>52</sup> See, e.g., Tennessee Gas Transmission Co., 26 F.P.C. 860 (Dec. 14, 1961).

<sup>53</sup> One of the few cases where the element of need was the sole reason for denying an import request was Montana Power Co. request in Inter-City Minnesota Pipelines Ltd., Inc., 1 ERA ¶ 70,502 (Feb. 16, 1980).

<sup>54</sup> For a brief time the ERA shifted the emphasis to national need on the basis of a theory of displacement. This theory argued that, even though the region receiving an import might have no clear need for foreign gas, the degree of interconnection among U.S. pipelines would permit domestic gas being used by that region to be transferred to other areas of the country where there was a need. Thus, the needs of one region were not to be determinative if there were an over-all national need. Note, Imported Natural Gas, supra note 60, at 436, citing Columbia LNG Corp., 1 E.R.A. ¶ 70,110 (CCH En. Mgt. Dec. 29, 1979).

<sup>55</sup> West Virginia Public Service Comm'n v. DOE, 681 F.2d at 860.

<sup>56</sup> Regional demand is not measured by a pipeline's contractual obligations to deliver gas. Such projections are unlikely to reflect the impact of conservation measures undertaken or planned by distribution companies and consumers. The appropriate measure is the aggregate demand of gas customers. In the case of LNG imports, the U.S. has defined the test of need to be whether distribution companies on the pipeline system would be willing to contract directly for the imported supplies. West Virginia Public Service Comm'n v. DOE, 681 F.2d at 860.

<sup>57</sup> See, e.g., Granite State Transmission, Inc., 1 E.R.A. ¶ 70,717 (CCH En. Mgt. Aug. 5, 1987). Fuel supplies that can be included in these calculations are critical to the results of the comparison. Supplies of uncertain deliverability are excluded from consideration. The Montana Power Co., 41 F.P.C. 420 (March 27, 1969). Moreover, domestic supplies must be economically accessible to the market to be considered. Where the transmission and sale of domestic supplies would be unprofitable, imports may be the only feasible way to meet market demand. Lopeno Gas Co., 11 F.P.C. 1144 (July 25, 1952). The availability of domestic alternative energy sources that could serve as substitutes for gas do not appear to be includable in the supply calculations to evidence an absence of need. California Gas Producers Ass'n v. FPC, 421 F.2d at 652. On the other hand, the requisite need for gas can be created in displacements of less desirable energy sources. Given the security problem created by the nation's dependence on foreign oil, the U.S. places special emphasis on gas imports that can substitute for oil imports, Chevron Natural Gas Services, Inc., 1 E.R.A. ¶ 70,716 (CCH En. Mgt. Aug. 4, 1987), or derivatives of crude oil, such as fuel oils, Northern Natural Gas Co., et al, 1 E.R.A. ¶ 70,504 (CCH En. Mgt. Jan. 15, 1980).

At times, the U.S. Agency has been satisfied with determinations of need by state public utility commissions. See, e.g., Vermont Gas System, Inc., 1 E.R.A. ¶ 70,534 (CCH En. Mgt. July 2, 1981).

<sup>58</sup> See St. Lawrence Gas Co., 26 F.P.C. 265 (Aug. 8, 1961).

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<sup>59</sup> See *West Virginia Public Service Comm'n v. DOE*, 681 F.2d at 862, 865. One difficulty with this approach to justifying the need for an import is the fact that price increases resulting from expensive foreign gas are incurred not by the consumers who need the gas but by those with satisfactory supplies. *Id.* at 866.

<sup>60</sup> 15 U.S.C. § 717b (1976). Responsibility for granting import/export authorization was originally delegated to the Federal Power Commission, but was reassigned by the Secretary of Energy pursuant to the Department of Energy Organization Act, 42 U.S.C. §§ 7252 and 7172(e)(1983), to the Economic Regulatory Agency and then the Office of Fossil Energy. See Delegation Order No. 0204-4, 42 Fed. Reg. 60,725 (Appendix)(Nov. 29, 1977); Delegation Order No. 0204-25, 43 Fed. Reg. 47,769 (Oct. 17, 1978); Delegation Order No. 0204-54, 44 Fed. Reg. 56,735 (Oct. 2, 1979); Delegation Order No. 0204-126, 54 Fed. Reg. 11,434 (March 20, 1989); and Delegation Order No. 0204-127, 54 Fed. Reg. 11,436 (March 20, 1989).

<sup>61</sup> *Distrigas Corp.*, 495 F.2d at 1065. Moreover, it has been acknowledged that the U.S. Agency's authority is as broad under Section 3 as under Section 7. *Cia Mexicana de Gas, S.A. v. FPC*, 167 F.2d 804, 806 (5th Cir. 1948).

In the context of section 7, the public interest has been construed by U.S. courts to generally require the availability of adequate supplies of natural gas at reasonable prices to provide the consumer protection intended by the NGA. But while consumer interests must be recognized, they need not always prevail, particularly with respect to decisions involving the import and export of gas. *West Virginia Public Service Comm'n v. DOE*, 681 F.2d 847, 865 (D.C. Cir. 1982)(factors including security of supply, need and costs which can affect energy policy, international relations and economics must be considered but do not excuse the basic standard).

<sup>62</sup> *Cia Mexicana de Gas, S.A.*, 167 F.2d at 806. More recently, one court has concluded that, under the latest import/export guidelines, the applicant has the burden of proof to establish that the proposed transaction is in the public interest. See *Panhandle Producers & Royalty Owners Ass'n v. ERA*, 822 F.2d 1105, 1107 (D.C. Cir. 1987)[hereinafter *Panhandle Producers I*]. In practice, however, there are indications that the government follows the traditional interpretation of the NGA and places the burden of proof on the intervenors (Platt, 1989, 414).

<sup>63</sup> See Delegation Order No. 0204-54, 44 Fed. Reg. 56,735 (Oct. 2, 1979). With respect to exports, the guidelines listed three specific factors to be considered in determining whether a transaction is inconsistent with the public interest, none of which is treated as controlling: (1) price; (2) regional and national need; and (3) consistency with DOE regulations. These factors have been at least implicitly accepted in *West Virginia Public Service Comm'n*, 681 F.2d at 865. The Order originally applied to imports as well and listed three additional factors that were to be considered for import authorization: (1) security of supply; (2) the effect of the sale on the U.S. balance of payments; and (3) the eligibility of purchasers to receive their respective shares. Insofar as the Order applied to imports, it was superseded by subsequent guidelines in 1984, as discussed below.

<sup>64</sup> National Energy Board Act, R.S.C. 1959 ch. 46, § 44.

<sup>65</sup> National Energy Board Act, R.S.C. 1985, c. N-7, s.118(a).

<sup>66</sup> S.C. 1990, c 7.

<sup>67</sup> As a state-owned monopoly, Pemex has exclusive control over exploration, development, refining, transportation, storage, distribution and first sale of oil, natural gas, and their byproducts. *Ley Reglamentaria del Artículo 27 Constitucional en el Ramo del Petróleo*, D.O.(Nov. 9, 1940), art. 3 (hereinafter referred to as the "Regulatory Law"), repealed, *Ley Reglamentaria del Artículo 27 Constitucional en el Ramo del Petróleo*, D.O.(Nov. 29, 1958), art.5. Despite the repeal of the

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Regulatory Law, this delegation continues in art. 3, section 1, *Ley Reglamentaria del Artículo 27 Constitucional en el Ramo del Petróleo* [Law Regulating Constitution Article 27 in Regard to Petroleum], D.O.(Nov. 29, 1958) (hereinafter referred to as the "Petroleum Law").

Under a recently re-organized structure, the company itself acts in the nature of a holding company over-seeing four separately operated parastatal entities, or organismos subsidiarios. Pemex-Exploración y Producción controls the exploration, development and production of crude oil and natural gas. Pemex-Refinación handles crude oil refining to manufacture oil products and basic industrial raw materials. Pemex-Gas y Petroquímica Básica has been assigned the task of processing natural gas, natural gas liquids, artificial gas and basic industrial raw materials derived from them. Finally, Pemex-Petroquímica produces secondary petrochemicals. Each company is responsible for the transportation and sale of its product.

<sup>68</sup> Such a body is characterized by a legal status separate from the government, a patrimony of its own, a degree of independence from general regulations, an ability to conduct commercial activities like a private enterprise and, in theory, an autonomy from government control.

<sup>69</sup> Each of the "subsidiaries" has its own eight-member board of directors and a director general. Pemex Charter, note 70, arts. 8, 9. As with Pemex, the President of Mexico continues to have significant control over the composition of the boards of directors that govern the four subsidiaries. The Director General of Pemex is the chairman of each subsidiary board. *Id.*, art. 9. Four members of each board are appointed by the President of Mexico and the remaining three board members for each subsidiary are the director generals of the other Pemex subsidiaries. Because the Pemex Director General and the director general of each subsidiary are presidential appointments, Pemex Charter, note 70, art. 6 (Pemex) and art. 8 (subsidiaries), the President determines the membership of all subsidiary boards.

<sup>70</sup> *Ley Organica de Petroleos Mexicanos* [Organic Law of Pemex], D.O. (Feb. 6, 1971), 306 *Diario Oficial* 3 (Jan. 1, 1971), art. 5. See also *Ley Organica de Petróleos Mexicanos y Organismos Subsidiarios* [Organic Law of Petróleos Mexicanos and Subsidiary Entities], D.O. (July 16, 1992) (hereinafter referred to as the "Pemex Charter"), art. 7. By law, two of the Presidential appointees must be the Minister of Finance and Public Credit and the Minister of Mines, Energy and Parastatal Industry. Traditionally, the remaining Presidential appointments have been three cabinet members and the director general of the Federal Electrical Commission. The President of the Pemex Board is the Secretary of Energy, Mines and Parastatal Industries. *Parastatal Law*, note 73 *supra*, art. 18; *Regulations to the Parastatal Law*, art. 16, sec. I. See also Pemex Charter, art. 7.

<sup>71</sup> *Organic Law of Pemex*, note 70, art. 6. See also Pemex Charter, note 70, art. 15.

<sup>72</sup> The Secretary of Energy, who is also the President of the Pemex Board, determines and coordinates the general terms of oil and gas policy for the country, and is charged with coordinating, evaluating and planning the operations of Pemex, *Organic Law of the Federal Public Administration. Ley Orgánica de la Administración Pública Federal* [Organic Law of the Federal Public Administration], D.O. (Dec. 29, 1976), 339 D.O. 2 (1976), art. 33. Additionally, the company's annual financial program is subject to the approval of the Ministry of Public Finance and Credit and any credit requests must be approved and registered by the Ministry, *Ley General de Dueda Pública* [General Law on Public Debt], D.O. (Dec. 31, 1976) arts. 2 *et seq.* The annual budget is also compiled by the Ministry, which submits then it for approval by Congress, *Ley de Presupuesto, Contabilidad y Gasto Público* [Law of Budgeting, Accounting and Public Expenditure], D.O. (Dec. 31, 1976); *Reglamento de la Ley de Presupuesto, Constabilidad y Gasto Publico* [Regulatory Law of Budgeting, Accounting and Public Expenditure], D.O. (Nov. 18, 1981). Company expenditures are reviewed by the federal Comptroller's Office. The Ministry of Communications and Transportation supervises transportation of petroleum products, *Organic Law of Federal Public Administration*, art. 36.

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<sup>73</sup> During each six-year administration, guidelines are set for exploration, production and other Pemex activities based on political considerations and economic priorities. Since the 1970's, each Presidential administration has constructed and published its own National Energy Plan that is consistent with its National Plan of Development under the country's National System of Democratic Planning. *Constitucion Política de los Estados Unidos Mexicanos* art. 27, para. 4 (Mex. 1917, amended 1960); *Ley de Planeación [Planning Law]*, art. 12 (D.O. Jan. 5, 1983). With respect to compliance requirements for the sectoral and institutional programs assigned to Pemex under the National Development Plan, see *Ley Federal de Entidades Paraestatales [Federal Law on Parastatal Entities]*, D.O. (May 14, 1986) (hereinafter referred to as the "Parastatal Law"), arts. 46 *et seq.* Each energy plan is designed by the Ministry of Planning and Budget in coordination with the Ministry of Energy, Mines and Parastatal Industry, Pemex and the Federal Commission of Electricity. *Planning Law*, note 73, arts. 16, 17, 21-24; *Organic Law of the Federal Public Administration*, note 72, arts. 32 and 33.

<sup>74</sup> *Columbia LNG Corp.*, 47 F.P.C. 1624 (June 28, 1972), *vacated*, *Columbia LNG Corp. v. FPC*, 491 F.2d 651 (5th Cir. 1974). In its early formulation, this test required that the import be the "cheapest alternative supply" available. *Distrigas Corp.*, 47 F.P.C. 752 (March 9, 1972), *remanded*, *Distrigas Corp. v. FPC*, 495 F.2d 1057 (D.C. Cir.), *cert. denied*, 419 U.S., 834 (1974). The FPC subsequently rejected the test as inconsistent with the NGA prescription for just and reasonable prices. See *Importation of Natural Gas Transported by Pipeline from the Dominion of Canada*, 52 F.P.C. 55 (July 8, 1974). To be not inconsistent with the public interest, the price was required to fall in the competitive range of prices charged in the relevant U.S. market area for a number of alternate fuels, rather than equal to or less than the cheapest among them. *Columbia LNG Corp., et al*, 1 E.R.A. ¶ 70,110 (CCH En. Mgt. Dec. 29, 1979)(residual fuel oil to be used in the case of Algerian LNG imported to the East Coast); *Pacific Indonesia LNG Co., et al*, 1 E.R.A. ¶ 70,108 (CCH En. Mgt. Sept. 26, 1979) (stove oil and electricity to be used in the case of imports to the California market). Prices above that level would require a showing that some special service, priced itself at actual cost, had been included that was required to effectively utilize the gas. *Northern Natural Gas Co., et al*, 1 E.R.A. ¶ 70, 504 (CCH En. Mgt. Jan. 15, 1980).

<sup>75</sup> *Border Gas, Inc.*, 1 E.R.A. ¶ 70,501 (CCH En. Mgt. Dec. 29, 1979).

<sup>76</sup> NEB. *Westcoast Transmission Company Limited, Natural Gas Export License Application, Reasons for Decision*, December 1967, at 7-1. See also Winberg (1987, 196); Hamilton (1974).

<sup>77</sup> Winberg (1987, 198).

<sup>78</sup> Winberg (1987, 198-99). As a result, Canadian export prices climbed from \$1.94(Cdn) to \$4.94 (U.S.) per mmBtu between 1977 and 1981.

<sup>79</sup> See *California Gas Producers Ass'n v. F.P.C.*, 421 F.2d at 651; *In re Montana Power Co.*, 11 F.P.C. 1 (Feb. 5, 1952); *Northwest Natural Gas Co.*, 13 F.P.C. 221 (June 18, 1954); *American Louisiana Pipe Line Co.*, 20 F.P.C. 575 (Oct. 31, 1958); *Pacific Gas Transmission Co.*, 24 F.P.C. 134 (Aug. 5, 1960); *Montana Power Co.*, 35 F.P.C. 191 (Feb. 8, 1966); *Columbia LNG Corp.*, 47 F.P.C. 1624 (June 28, 1972), *vacated*, *Columbia LNG Corp. v. FPC*, 491 F.2d 651 (5th Cir. 1974); *Trunkline LNG Co.*, 58 F.P.C. 726 (April 29, 1977); *Granite State Gas Transmission, Inc.*, 1 E.R.A. ¶ 70,717 (CCH En. Mgt. August 5, 1987); *Natural Gas Pipeline Co.*, 1 E.R.A. ¶ 70,734 (CCH En. Mgt. October 30, 1987).

<sup>80</sup> See, e.g., *Midwestern Gas Transmission Co.*, 22 F.P.C. 775 (Oct. 31, 1959). But the U.S. Agency has been realistic enough to recognize that peak demand on an entire pipeline system is not likely to occur at one time. *Id.* The U.S. Agency at one time also considered as relevant the issue of whether the exporter could generate enough surpluses to meet the Canadian reserve requirement. Applications were occasionally denied without benefit of a determination of the matter by Canadian authorities.

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See American-Louisiana Pipe Line Co., 20 F.P.C. 575 (Oct. 31, 1958); Tennessee Gas Transmission Co., 26 F.P.C. 860 (Dec. 14, 1961).

<sup>81</sup> Pacific Gas Transmission Co., 24 F.P.C. 134 (Aug. 5, 1960). See also California Gas Producers Ass'n v. FPC, 421 F.2d at 651; In re Texas Eastern Transmission Corp., 16 F.P.C. 27 (Oct. 9, 1956).

<sup>82</sup> See, e.g., Granite State Gas Transmission Corp., 1 E.R.A. ¶ 70,717 at 72,713 (CCH En. Mgt. Aug. 5, 1987); Tennessee Gas Pipeline Co., 1 E.R.A. ¶ 70,726 at 72,746 (CCH En. Mgt. Oct. 9, 1987); Natural Gas Pipeline Company of America, 1 E.R.A. ¶ 70,734 at 72,771 (CCH En. Mgt. Oct. 30, 1987); ANR Pipeline Co., 1 E.R.A. ¶ 70,748 (CCH En. Mgt. Jan. 22, 1988); Vermont Gas Systems, Inc., 1 F.E. ¶ 70,501 (CCH En. Mgt. Nov. 26, 1991); Pepperell Power Associates Limited Partnership, 1 F.E. ¶ 70,655 (CCH En. Mgt. Oct. 23, 1992).

<sup>83</sup> Reinhold Chemicals, Inc., 1 E.R.A. ¶ 70,570 (CCH En. Mgt. Sept. 14, 1984); Granite State Gas Transmission Corp., 1 E.R.A. ¶ 70,717 at 72,713 (CCH En. Mgt. Aug. 5, 1987); Natural Gas Pipeline Company of America, 1 E.R.A. ¶ 70,734 at 72,771 (CCH En. Mgt. Oct. 30, 1987); Vermont Gas Systems, Inc., 1 F.E. ¶ 70,501 (CCH En. Mgt. Nov. 26, 1991); Lockport Energy Associates, L.P., 1 F.E. ¶ 70,630 (CCH En. Mgt. Aug. 31, 1992)(national reserves); Pub. Serv. Dept., The City of Burbank, California, 1 F.E. ¶ 70,648 (CCH En. Mgt. Nov. 23, 1992)(Canadian exporter with adequate reserves under contracts with producers).

<sup>84</sup> Pub. Serv. Dept., The City of Burbank, California, 1 F.E. ¶ 70,648 (CCH En. Mgt. Nov. 23, 1992).

<sup>85</sup> The U.S. Agency continues to place emphasis on diversity of supply, particularly when it reduces undue dependence on vulnerable oil imports. Granite State Gas Transmission Corp., 1 E.R.A. ¶ 70, 77, at 72,712, 72,714 (CCH En. Mgt. Aug. 5, 1987).

<sup>86</sup> Panhandle Producers & Royalty Owners Ass'n v. ERA, 847 F.2d 1168, 1175 (5th Cir. 1988). See description of ERA review in New England Fuel Institute v. ERA, 875 F.2d 882 (D.C. Cir. 1989). Nevertheless, to say that the policy guidelines are not binding is not to say they do not or cannot have substantive effect. The U.S. Agency can rely on the policy guidelines, including the presumptions, as long as the guidelines are non-binding and the presumptions rebuttable. Mobil Gas Company, Inc., 1 E.R.A. ¶ 70,745 (CCH En. Mgt. Jan. 6, 1988).

<sup>87</sup> The ERA assumed the following position on the effect imported gas would have on domestic producers under the new guidelines:

[The complainants'] concern that [the proposed] import will have a "dampening effect" on domestic gas exploration ... reflects a legitimate concern by domestic producers about their ability to market their gas. Yet, rejection of this import would not solve the problem faced by these producers. The decline in gas exploration may indicate that takes from domestic producers are influenced by the price they charge as much as by factors relating to this Canadian gas import. The ERA believes participants in the changing natural gas market must be sufficiently flexible to respond to competition in order to retain market positions. It is important that neither domestic nor imported supplies are discriminated against in order to foster the competition that will benefit the gas industry and consumer alike. The appropriate course for [complainants] is to make their gas more marketable, not to seek to limit competition in the marketplace.

Northridge Petroleum Marketing U.S., Inc., 1 E.R.A. ¶ 70,610 (CCH En. Mgt. Nov. 27, 1985). See also Texarkoma Transportation Co., 1 E.R.A. ¶ 70,732 at 72,764-65 (CCH En. Mgt. Oct. 26, 1987); Granite State Gas Transmission, Inc., 1 E.R.A. ¶ 70,717 at 72,712 (CCH En. Mgt. Aug. 5, 1987) (where the opposition asserted that "the proposed project may be too competitive in the market"); Brooklyn Union Gas Co., 1 F.E. ¶ 70,515 (CCH En. Mgt. Dec. 19, 1991).

<sup>88</sup> In order to grant export licenses, the NEB is required by statute to "satisfy itself that the quantity of oil, gas or power to be exported does not exceed the surplus remaining after due allowance has been

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made for the reasonably foreseeable requirements for use in Canada having regard ... to the trends in the discovery of oil or gas in Canada ...." National Energy Board Act, R.S.C. 1985, c. N-7, s.118(a). The original NEB Act contained this provision in s. 83(a). Based on this, the NEB has evaluated need on the basis of national requirements and has rarely been concerned with regional need. Where it has indicated an interest in regional need, it has done so on the basis of some other factor. In 1982, the NEB declined to consider regional surpluses, but indicated that it might do so "to provide access to export markets for gas from specific projects for which higher returns may be necessary." NEB, Phase I - The Review Phase of the Gas Export Omnibus Hearing, 1982, Reasons for Decision, May 1982, 23. The next year, the lack of an interprovincial agreement on the apportionment of border flowback led to the denial of an export license application. Saskatchewan gas was to be exported at the same time the Province was importing Alberta gas for its domestic market. The NEB took the position that the chance of a dispute in this context raised an issue that affected the national public interest. NEB, Gas Export Omnibus Hearing, 1982, Part II - The License Phase, Phase III - The Surplus Phase, Reasons for Decision, January 1983, 73 (application by Ocelot Industries Ltd.).

<sup>89</sup> NEB, Gas Export Omnibus Hearing, 1982, Phase II - The License Phase and Phase III - The Surplus Phase, Reasons for Decision, January 1983, 33. See also McDougall (1973, 327); Bartin (1984, 488). Where appropriate, however, the NEB will attempt to continue supply to existing markets. 1 Canada Energy Law Service 10-1596 (Hunt & Lucas eds. 1990).

<sup>90</sup> *Id.* at 18. Nevertheless, in its Phase III determination, the NEB later did assume that gas demand in the Atlantic region would be met from Sable Island, which was considered a frontier source at the time, thereby freeing western gas from that supply obligation. NEB, Phase II - The License Phase and Phase III - The Surplus Phase of the Gas Export Omnibus Hearing, 1982, Reasons for Decision, January 1983, 28-29.

<sup>91</sup> SOR/84-467.

<sup>92</sup> 1 Canada Energy Law Service 10-1597 to -1598 (Hunt & Lucas eds. 1990).

<sup>93</sup> New Policy Guidelines and Delegation Orders from Secretary of Energy to Economic Regulatory Administration and Federal Energy Regulatory Commission Relating to the Regulation of Imported Natural Gas, 49 Fed. Reg. 6,684 (Feb. 22, 1984)(hereinafter New Import Guidelines). The guidelines are incorporated into Delegation Order No. 0204-111, 49 Fed. Reg. 6,690 (Feb. 22, 1984).

Like Canada's National Energy Board in the 1950's, the DOE decided that any action to compel changes in existing contracts would be inappropriate given the long-standing commitment to the sanctity of contract under U.S. trade policy and the negative impact it would have when supply conditions again increased U.S. dependence on imports. As a consequence, the changes were prospective. New Import Guidelines, note 93, at 6,689. However, requests before the U.S. Agency for extension or modification of earlier import authorities would be judged under the new criteria. Moreover, U.S. companies were encouraged to renegotiate their contracts to bring them into compliance with the new policies. See *Midwestern Gas Transmission Co.*, 1 E.R.A. ¶ 70,567 (CCH En. Mgt. July 12, 1984) (reduction in minimum volume and take-or-pay obligations); *Texas Eastern Transmission Corp.*, 1 E.R.A. ¶ 70,634 (March 21, 1986); *ANR Pipeline Co.*, 1 E.R.A. ¶ 70,748 (Jan. 22, 1988).

<sup>94</sup> The new guidelines apply only to new import arrangements. Nevertheless, the Commission has taken the position that their market-oriented principles are to be applied to export applications as well. *Yukon Pacific Corp.*, 1 E.R.A. ¶ 70,259 at 71,128 (Nov. 16, 1989). Moreover, the Delegation Order that implemented the new import guidelines also reduced the factors for export evaluation to domestic need and other matters appropriate in the circumstances. These "other matters" can be expected to be the same as the traditional factors cited in earlier guidelines and decisions.

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<sup>95</sup> "[These policies] represent a belief that competitive markets are in the public interest and that increased competition, particularly increased activity in the gas spot market, will benefit consumers with lower gas prices, expand markets for gas sellers, and result in greater use of pipeline capacity." Enron Gas Marketing, Inc., 1 E.R.A. ¶ 70,676 (CCH En. Mgt. Nov. 6, 1986). See also Northridge Petroleum Marketing U.S., Inc., 1 E.R.A. ¶ 70,609 (Nov. 27, 1985). The Commission's first move in this direction can be found in some opinions in the early 1980's approving several short-term import arrangements. In one case offering gas for a one-year term on a "best efforts" basis with no minimum bill or take-or-pay requirement, the U.S. Agency noted that there would be no need to purchase costly imported gas when less expensive domestic supplies were available and that "the contractual arrangement under question does not raise the possibility of unnecessary and uneconomic reliance." *Midwestern Gas Transmission Co.*, 1 E.R.A. ¶ 70,519 (Oct. 16, 1980). See also *Great Lakes Gas Transmission Co.*, 1 E.R.A. ¶ 70,520 (Oct. 20, 1980); *Great Lakes Gas Transmission Co.*, 1 E.R.A. ¶ 70,535 (Oct. 23, 1981); *Midwestern Gas Transmission Co.*, 1 E.R.A. ¶ 70,536 (Oct. 26, 1981); *Midwestern Gas Transmission Co.*, 1 E.R.A. ¶ 70,541 (Nov. 1, 1982); *Vermont Gas System, Inc.* 1 E.R.A. ¶ 70,556 (Jan. 9, 1984).

<sup>96</sup> *New Import Guidelines*, note 93, at 6,687. The number of authorized gas transactions between the U.S. and Canada has increased significantly since the *New Import Guidelines* were issued. Before 1984, 17 companies were engaged in such trade. Under the new guidelines, approximately 250 companies are involved and over 500 authorizations have been issued.

<sup>97</sup> *National Energy Board Act*, R.S.C. 1985, c. N-7, s.118(a).

<sup>98</sup> This presumption may still be rebutted by contrary evidence. *Panhandle Producers & Royalty Owners Ass'n v. ERA*, 822 F.2d 1105, 1107 (D.C. Cir. 1987). Lump-sum payments have also been deemed competitive. *G.A.S. Orange Development, Inc.*, 1 E.R.A. ¶ 70,815 at 72,987-88 (CCH En. Mgt. Oct. 17, 1988).

<sup>99</sup> Dept. of Energy, Mines and Resources. *Communique 83/75*, 6 July 1983.

<sup>100</sup> Dept. of Energy, Mines and Resources. *Communique 84/81*, 13 July 1984.

<sup>101</sup> *Agreement on Natural Gas Markets and Prices* ¶ 18 (Oct. 31, 1985). Any artificial limitation in the floor set by comparable charges to Canadian consumers was eliminated by the 1986 decontrol of domestic gas prices.

<sup>102</sup> *The U.S. Natural Gas Clearinghouse, Ltd.*, 1 E.R.A. ¶ 70,602 (July 5, 1985).

<sup>103</sup> *Enron Gas Marketing, Inc.*, 1 E.R.A. ¶ 70,676 (Nov. 6, 1986); *Alenco Resources Inc.*, 1 E.R.A. ¶ 70,808 (Aug. 31, 1988).

<sup>104</sup> *Northwest Alaskan Pipeline Co.*, 1 E.R.A. ¶ 70,585 (Feb. 26, 1985).

<sup>105</sup> NAFTA was preceded by the Canada-United States Free Trade Agreement, which became effective in 1989. This previous Agreement remains in force but is subordinate to the provisions in NAFTA. It is unclear how conflicting provisions in the Uruguay Round agreements will affect the application of NAFTA.

<sup>106</sup> By the time NAFTA was implemented, the U.S. and Canada had removed all duties on gas and electrical power imported into their countries. Mexico's tariff on natural gas and electrical power was set at 10 percent ad valorem.

<sup>107</sup> Tariffs are still removed on all trade between the U.S. and Canada by 1998 under the CFTA, 1988 § 4.04(A).

<sup>108</sup> NAFTA § 314. The sole exception applied to certain foodstuffs critical to the Mexican domestic market.

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<sup>109</sup> NAFTA art. 604.

<sup>110</sup> NAFTA arts. 309 and 603.1. GATT protocols of provisional application, such as those granting special rights for developing countries are excluded from this incorporated reference.

Although all three NAFTA parties were previously bound by these GATT provisions, the inclusion of the same rules in NAFTA carries the advantage of permitting disagreements to be submitted to the dispute resolution procedures created in NAFTA as well as those available under GATT. Chapter 20 of NAFTA delegates certain dispute resolution activities to a Free Trade Commission composed of cabinet level representatives from each NAFTA country. The Commission must use consultations, conciliation/mediation, and then arbitration to resolve any dispute. Upon receipt of an arbitral panel's report, disputing parties must agree on a resolution "which shall normally conform with the determinations and recommendations of the panel." NAFTA art. 2018(1).

<sup>111</sup> NAFTA art. 603.5.

<sup>112</sup> NAFTA Annex 603.

<sup>113</sup> NAFTA art. 603.2. GATT, and hence NAFTA, does allow for certain exceptions, including the use of price requirements to enforce antidumping and countervailing duties orders.

<sup>114</sup> NAFTA § 301. Except for the extension to local governments, this provision is largely a replication of national treatment duties contained in Article III of GATT. Its inclusion in NAFTA subjects the requirement to dispute resolution under either agreement.

<sup>115</sup> NAFTA art. 606 also requires each country to seek to ensure that energy regulations avoid disruption of contractual relations "to the maximum extent practicable."

<sup>116</sup> NAFTA art. 605.

<sup>117</sup> Each country is also permitted to restrict energy trade for certain national security reasons. See NAFTA art. 607.

<sup>118</sup> NAFTA art. 605(a).

<sup>119</sup> NAFTA art. 605(b).

<sup>120</sup> NAFTA art. 605(c).

<sup>121</sup> CFTA art. 409.

<sup>122</sup> See NAFTA Annex 315 and Annex 605.

<sup>123</sup> NAFTA Annex 602.3.

<sup>124</sup> NAFTA arts. 1502(1) and 1503(1).

<sup>125</sup> NAFTA art. 1501(1). However, this general commitment is not subject to NAFTA's dispute resolution procedures. NAFTA art. 1501(3).

<sup>126</sup> NAFTA art. 1502(3)(b). This requirement does not apply to government procurement of goods and services, *Id.* art. 1502(4), or to monopoly enterprises created by states and provinces, rather than by the federal government, *Id.* art. 1503.

<sup>127</sup> NAFTA art. 1502(3)(c). This proscription applies to federal and state created enterprises. *Id.* art. 1503(3).

<sup>128</sup> NAFTA Annex 602.3(3).

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<sup>130</sup> See, Ley Reglamentaria del Artículo 27 Constitucional en el Ramo del Petróleo, D.O.

<sup>131</sup> Art. 3, CRE Natural Gas Regulations (1996).

<sup>132</sup> Art. 3(IV), Decree Amending the Law on the Public Service of Electric Power, D.O. (Dec. 23, 1992).

<sup>133</sup> *Id.*, art. 3(III).

<sup>134</sup> Art. 121, Regulation of the Law on the Public Service of Electric Power, D.O.

<sup>135</sup> *Id.*, art. 117.

<sup>136</sup> *Id.*, art. 118.

<sup>137</sup> *Munn v. Illinois* in 1877, in which the Supreme Court identified grain elevators and warehouses as being businesses “in the public interest” and therefore subject to regulation outside of the due process provision is generally credited as the key event leading to our regulatory framework. In *Nebbia v. New York*, 1934, which involved the price and distribution of milk, the Supreme Court reaffirmed and expanded the application of the public interest concept.

<sup>138</sup> An analysis of public utility regulation among the U.S. states and natural gas distribution issues by Michot Foss (1995) found support for the widespread view that during times of upheaval, state regulatory commissions often deviate widely. As solutions are demonstrated, commissions tend to share and adopt practices, coming closer together. The extent of deviation has a direct impact on the time frame for adjustment.

<sup>139</sup> Michot Foss (1995; see note 138) concluded that state PUC responses to LDC unbundling would be heavily constrained by politics inherent in the public utility institutional arrangement.

<sup>140</sup> Reddy and Zhao (1990).

<sup>141</sup> Robinson (1988).

<sup>142</sup> Keller and Chinta (1988).

<sup>143</sup> Burgelman, Maidique and Wheelwright (1996).

<sup>144</sup> Granstrand, Hakanson and Sjolander (1992).

<sup>145</sup> Keller and Chinta (1988).

<sup>146</sup> Reddy and Zhao (1990).

<sup>147</sup> Kogut (1993).

<sup>148</sup> Julian & Keller (1991).

<sup>149</sup> Kogut (1993).

<sup>150</sup> Robinson (1988).

<sup>151</sup> Keller, Julian and Kedia (1996).

<sup>152</sup> See note 138.

<sup>153</sup> At one time, a proposal was formulated to allow staff sharing between the NEB and the FERC, including opportunities to observe hearings and other procedures. Political opposition to the idea prevented this kind of relationship between the two agencies from developing.

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<sup>154</sup> Leebron (1996) is not so sanguine on the net benefits of regulatory harmonization. The chance that net benefits may not be positive is an important point to consider. Leebron carefully lays out the various justifications for harmonization (which he defines loosely as the making of regulations across jurisdictions “identical or at least more similar” (page 66). He balances the justifications for harmonization against the value of differences across countries or regions.

<sup>155</sup> After Mobasheri, Orren and Sioshansi (1989).

<sup>156</sup> This term was coined by Mr. Roland Priddle, former Chairman of the NEB.

<sup>157</sup> See Michot Foss and Johnson, 1991; Michot Foss, Garcia and Johnson, 1993; Michot Foss 1993, 1994, 1995, 1996.

<sup>158</sup> As Mexico began to build its program for private investment in natural gas transportation, distribution and storage, key meetings were held between regulators at the CRE and their colleagues at NEB, FERC and among some provincial and state regulatory commissions. One such meeting was hosted by the Energy Institute at the University of Houston on May 31, 1995 at the request of the U.S. Department of Energy. The full-day exchange on natural gas industry and regulatory issues included officials from the CRE and SE in Mexico; FERC, U.S. DOE and the California and Texas public utility commissions; and NEB, Alberta and Ontario regulators.

<sup>159</sup> See note 138.

<sup>160</sup> An example is the U.S. DOE’s 1991 National Energy Strategy. This document emphasized competition in the wholesale, bulk power market and increased competition for natural gas. The NES led to language to the Energy Policy Act of 1992 that opened the door to broad electricity structuring in the U.S.

<sup>161</sup> An advisor to our study once remarked, “The only difference between a country like the U.S. and a country like Mexico is that we have a greater proportion of poor people.” We took this admonition to heart.

<sup>162</sup> “Canadian Pipeline Companies, Gas Producers Reach Accord,” Petroleum Information, *Rocky Mountain Region Report*, April 9, 1998.

<sup>163</sup> Reuters, November 5, 1997.

<sup>164</sup> *The Ottawa Citizen*, August 24, 1997.

<sup>165</sup> The term “market facilitators” is attributed to Dave Matthews, Ontario Energy Board.

<sup>166</sup> The FPAs or, as Fox-Penner (1997) terms them power marketing associations (PMAs) are obligated to provide firm power to public utilities (such as municipal utilities) and cooperatives and can only make power available to IOUs during periods of excess capacity.

<sup>167</sup> Based on extensive conversations with natural gas marketers, brokers and pipeline operators during the normal course of tracking natural gas market events.

<sup>168</sup> We have argued consistently that there are more reasons for Pemex to build a vigorous natural gas export program than to import gas on a net basis (see Michot Foss and Johnson, 1991; Michot Foss, Garcia and Johnson, 1993; Michot Foss 1993, 1994, 1995, 1996). Since our early work on this problem, healthier, post-war Central American economies offer intriguing possibilities for gas exports from Pemex’s southern basins. With sustained investments by Pemex in its northern fields, we can easily envision a two-pronged approach. Pemex might build a gas export program with gas flowing south to Central America and also north to Mexico City and Monterrey, backing up any gas from

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Mexico's northern fields that is in excess of local demand into the U.S. We expect northwestern Mexico to remain a viable export market for U.S. and Canadian supplies.

<sup>169</sup> See Michot Foss, 1993, 1994, 1995, 1996.

<sup>170</sup> A separate study on LPG markets in Mexico was released by the Energy Institute in 1996 (Garcia, et. al., 1996). Although residential use constitutes about 90 percent of LPG sales in Mexico, overall the amount of energy consumed in this form is small. There is no winter heating season to speak of, which supports our arguments that most growth in natural gas demand will be derived from industrial use for the foreseeable future.

<sup>171</sup> Resistance to wheeling power into Mexico is not restricted to interests within that country. It became clear during the course of our study that interests in Texas strongly oppose the development of direct, high voltage interconnects for wheeling because power could be wheeled through Mexico into the ERCOT (Electric Reliability Council of Texas) threatening established providers.

<sup>172</sup> "FERC Orders El Paso to Provide Open Access to Mexico," *Megawatt Daily*, April 16, 1998.

<sup>173</sup> SE, 1997, *Prospectiva del Sector Electrico*.

<sup>174</sup> A good example for North American interests is the progression of British Gas from state owned enterprise to private company struggling to compete in its traditional markets. Nor are investor-owned utilities in Canada and the U.S. insulated from these trends.

<sup>175</sup> The concept of experimentation in the Mexico-U.S. border region is attributed to Dr. Jesus Reyes-Heróles, Secretary of Energy for Mexico during the time of this study.

<sup>176</sup> We borrowed this concept from Leebron (1996), an intriguing way of considering regulatory institutions within the context of cross-jurisdictional trade.

## Appendix

<sup>177</sup> For more information on fuel sources and competition in Mexico, see Michot Foss and Johnson (1991) and Michot Foss, Garcia and Johnson (1993).

<sup>178</sup> Many examples of market-based programs can be found in the industry trade literature, particularly *Public Utilities Fortnightly* and *Natural Gas Intelligence*. NARUC and CAMPUT conferences and workshops are also sources.

<sup>179</sup> A program for customer aggregation that includes low income users exists in the state of Montana.

<sup>180</sup> A group of small LDCs in the North Carolina-West Virginia region formed one of the first gas purchase co-ops after implementation of Order 636 in the U.S. (see Table A-9).

<sup>181</sup> Stranded assets are those capital assets that are not considered competitive, and thus are valued as such, in open markets for gas or electricity.

<sup>182</sup> NEB File 4600-A000-4.

<sup>183</sup> Adapted from Michot Foss (1995).

<sup>184</sup> Adapted from Michot Foss (1995). Refer to that document for details on information sources for Table A-9.

<sup>185</sup> *MPC I*, 761 F.2d 768 (D.C. Cir. 1985); *MPC II* 761 F.2d 780 (D.C. Cir. 1985). MPC I and MPC II originated when Columbia Gas sought to invoke force majeure provisions of its gas purchasing contracts to escape TOP liabilities. Exxon, Columbia's largest supplier, agreed to release Columbia

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from its liability to the extent that Columbia would allow Exxon to market gas not taken by Columbia to other customers. Columbia was required by Section 7 of the NGA to secure an SMP certificate. The cases filed by the Maryland People's Counsel argued that resales would be discriminatory. FERC ruled that the Columbia program be expanded to include all of the company's suppliers. The courts ruled against FERC's decisions (Mogel, 1986: 76-82).

<sup>186</sup> 27 FERC ¶ 61,310 (1984).

<sup>187</sup> 770 F.2d 1144 (D.C. Cir. 1985).

<sup>188</sup> 32 FERC ¶ 61,009 (1985).

<sup>189</sup> 30 FERC ¶ 61,144 (1985).

<sup>190</sup> FERC ¶ 32,441, 52 Fed. Reg. 18,703 (1987) as cited in Johnson (1989).

<sup>191</sup> 33 FERC ¶ 61,007, 50 Fed. Reg. 52,217 (1985) as cited in Phillips (1993).

<sup>192</sup> Order 436, *FERC Stats. & Regs.* ¶ 30,665, at 31,470 (1985). As cited by Mogel (1986).

<sup>193</sup> 824 F.2d 1081 (D.C. Cir. 1987). Phillips (1993, footnotes) and Vietor (1994) vividly describe the vehement industry reaction to Order 436.

<sup>194</sup> III FERC Stat. and Regs. ¶ 30,701, 51 Fed. Reg. 22,168 (1986) as cited by Johnson (1989).

<sup>195</sup> P.L. 100-42, 101 Stat. 310 (1987), as cited in Pierce (1988).

<sup>196</sup> P.L. 100-42, 101 Stat. 310 (1987), as cited in Pierce (1988).

<sup>197</sup> 40 FERC ¶ 61,172 as cited in Phillips (1993).

<sup>198</sup> 888 F.2d 136 (D.C. Cir. 1989).

<sup>199</sup> *Policy Statement Providing Guidelines with Respect to the Designing of Rates*, 54 Fed. Reg. 24385 (1985).

<sup>200</sup> 49 FERC ¶ 61,325.

<sup>201</sup> 893 F.2d 349 (D.C. Cir. 1989).

<sup>202</sup> 50 FERC ¶ 61,141 (1990).

<sup>203</sup> 912 F.2d 1496 (D.C. Cir. 1990).

<sup>204</sup> 53 FERC ¶ 61,163 (1990)

<sup>205</sup> The FERC objective under the chairmanship of Martha Hesse (Vietor, 1994).

<sup>206</sup> 59 FERC ¶ 61,030

<sup>207</sup> "GAO Backs Order 636," *Oil & Gas Journal*, July 19, 1993. GAO, 1993 (62-63 and elsewhere).

<sup>208</sup> Of the 1,250 tcf of gas (proved, probable and potential) estimated by the NPC for the U.S., about half is expected to be produced from "nonconventional" reservoirs.

<sup>209</sup> One study that has attempted to address the lack of ability by pipelines to exercise market power is Gallick (1993). Gallick's work suggested at the time that few markets in the U.S. exhibited transportation prices that were far from what a competitive price would be, and attributed this behavior to the contestability of U.S. transportation markets, i.e., the discipline exerted by the potential for new pipeline capacity to be added. One region that did have transportation prices in excess of the estimated market price was the southeastern U.S. At the time Gallick conducted his

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study, inadequate pipeline capacity existed to serve rapidly growing demand for natural gas, particularly in Florida. New pipeline capacity constructed in response to surging demand has since resulted in much lower citygate prices.

<sup>210</sup> The NRRI Internet site (see sources at beginning of Appendix) includes a “box score” with the status of state initiatives on electricity restructuring.

<sup>211</sup> The question of “who pays what” in restructuring regulated industries poses an interesting quandary. To what extent might or should regulators be held responsible for their decision making? Clearly, regulatory commissions and boards in Canada and the U.S. could only act on information available at the time decisions were made and within the constraints posed by prevailing energy policy and market conditions. Just as clearly, regulated utilities were acting under similar constraints in planning investments to meet perceived future needs. We found the various aspects of these issues to be intriguing. With more market discipline in place than has traditionally existed in the natural gas and electric power industries, we should see decision making take a different form and witness cases that strengthen the arguments in favor of markets for gas and power.

<sup>212</sup> See Michot Foss and Johnson (1991); Michot Foss, Garcia and Johnson (1993); Michot Foss (1993, 1994, 1995, 1996).

<sup>213</sup> Garcia, Michot Foss, Westbrook and Campos (1996) provide detailed analysis of the LPG-natural gas trade-off in Mexico’s domestic markets.

<sup>214</sup> “FERC Orders El Paso to Provide Open Access to Mexico,” *Megawatt Daily*, April 16, 1998.

<sup>215</sup> Garcia, Michot Foss, Westbrook and Campos (1996).