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SHORT NOTE

Energy reform: redesigning the Mexican model

Redesigning the
Mexican model

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Abstract

Purpose – The purpose of this paper is to express the need for a continuous comprehensive institutional, organizational, and regulatory change both at the sector level and in each energy industry in Mexico.

Design/methodology/approach – The paper describes the Mexican model of energy reform, highlighting the deficiencies of the present model and suggesting that there is a need for a continuous and comprehensive change to face the energy sector challenges.

Findings – An imprecise and outdated legal and regulatory framework coupled with historical and political factors allowed limited changes in the country's energy sector. The paper suggests that an evolution is necessary but must occur within the Mexican constitutional framework, although the constitution does not clearly establish the limits of public and private sector activity in order for it to effectively regulate them. The huge task of institutional and regulatory reform in Mexico should occur gradually and in clearly defined stages, making a precise distinction between the more efficient administration of public sector companies and the entry of new participants.

Originality/value – The paper outlines the need for energy reform in Mexico.

Keywords Energy industry, Public sector reform, Organizational change, Mexico

Paper type Research paper

Energy supply is not simply a problem of energy resources – although the exhaustion of non-renewable and, in geopolitical terms, their location, are both causes of concern – but above all one of finding new ways to facilitate, with adequate institutions and regulations, the production, distribution, and consumption of energy. The objective should be to assure an energy supply that contributes to a better quality of life, technological development and environmental protection.

In Mexico, the evidence suggests a domestic institutional and regulatory environment that is less dynamic than its international counterparts. Institutional, organizational, and regulatory changes have been not absent but limited in Mexico due mainly to historical and political factors: the nation's energy wealth continues to be considered a bottom-line component of social cohesion[1]. Evolution is necessary but must occur within this inescapable reality. What is at stake in the near future is the ability of a new government, taking office December 1, 2006, to implement an energy reform after the deep divisions that erupted after the July elections. President Fox's

The ideas presented here are based on prior author's articles in Spanish, particularly in *EconomíaUNAM*, Vol. 4, 2005. Other antecedents can be found in a text prepared for a conference in the Department of Political Sciences, Université de Montréal, March 30, 2006 (www.cerium.ca/cemc).



administration has been confronted with an adverse congress, but he has not been able to articulate a proposal in order at least to advance an organized debate about the energy reform.

Other countries have tried with success to align the internal and external dynamics of their energy problem. France and China, both until recently characterized by a high degree of rigidity, are cases of particular interest to Mexico. In France, the legal framework and business environment gradually adapts to the broader European model of open investment and liberalization. China faces extraordinary challenges of consumption and investment, and has reformed and reorganized its energy sector by modernizing its legal and institutional framework.

It seems evident that the Mexican energy sector must meet the challenges of institutional, organizational and regulatory change. Reasons and factors concern the internal dynamics of the energy sector, but not only: forces inside and outside Mexico are hastening these institutional changes, particularly involving Mexico in the whole North American energy flows. Nowadays, transformations in industries have to do not only with internal reforms but also with international frameworks under construction. New institutional instruments, like multilateral treaties, provide rules for trade and investment that become references for deregulation, liberalization processes and markets creation at the national level. The search for a better environmental quality and increasing demands for environmental accountability in the energy industries are also factors pushing in the direction of energy reform, taking into account particularly the dominance of hydrocarbons in Mexico's energy balance (90.6 percent of primary energy consumption in 2004).

The present situation, in energy terms, has not yet reached a critical situation, but in the near future a way must be found to meet rapid growth in demand, especially in gas and in electricity. During several decades along the twentieth century, the state-owned oil and gas company, Petroleos Mexicanos (Pemex), and the national electricity utility, Comisión Federal de Electricidad (CFE), have fulfilled the energy needs of Mexico's development, but new energy challenges have appeared combined with a more open and liberalized economy. At a same time insufficiencies and failures appeared in the traditional Mexican energy model which was confronted with new demands both in quantity and in quality.

Mexico is an important oil producing country (fifth in the world) and a net energy exporter. It sends abroad around half of its oil production (basically to the US market), but proven reserves will last only ten years at the present production level and with a low repository factor. Mexico exports mainly crude oil: in 2005 due to limited refinery capacity it imported 38 percent of gasoline consumed domestically and 25 percent of GPL. Natural gas production has been unable to keep up with growing demand: imports have climbed and reserves will last only 11 years at the pace of present production. In the coming years Mexico's demand for natural gas, according to official figures, is likely to grow at around 6 percent, especially the demand for the electricity generation[2]. Gas natural imports have been growing subjected to price pressures and the internal restrictions of the US market where the Mexican imports come from. Over the past decade, electricity consumption has increased at an annual average rate of 5.1 percent, but generating capacity rose by only 4.5 percent per year. Generating capacity now totals 36 gigawatts and new capacity will be needed.

If official provisions about consumption are confirmed, the energy sector will need enormous investments. In the case of electricity alone Mexico needs to invest US\$ 51 billion over the next decade, according to the Secretary of Energy. Taking into account the present organization of the energy sector, state owned enterprises must bear the greatest part of the burden. The problem is that they remain limited by a lack of capital and that government cash requirements – particularly with respect to Pemex whose fiscal contribution represents more than one third of the federal budget – do not allow them to work as autonomous entities with their own business strategies. At the same time the energy industries are closed or restricted for private actors, both national and foreign. In this context, a crucial point to define is if it is possible to meet investment requirements without changes in the existing institutional framework and new market arrangements. From different horizons a consensus is being built: a whole new institutional and regulatory architecture is needed.

Some problems in the oil industry are explained by the corporate failings of Pemex: its management (political appointments, executive instability), its accounting system, its fiscal regime, its buying and contracting practices, the relationships that exist between subsidiaries[3], the relationships that exist with labor union[4]. Regarding its core business, Pemex, faced with huge challenges in the coming years, does not have the capacity to manage and finance complex projects, particularly deepwater drilling. Certain improvements in the Pemex management, related, for example, with its financing, could not be solved without examining more general problems. This would be the case of the Pemex fiscal burden which will not be alleviated if a more general fiscal reform is not realized. Meanwhile, other problems are due to an imprecise and outdated legal and regulatory framework. Of the latter case an example is the apparent consensus that Pemex, faced with the decline of current oilfields and particularly that of Cantarell[5], needs to overcome financial and technological weaknesses and open new deepwater exploration and production (E&P) capabilities (Gulf of Mexico). The required institutional and regulatory innovation, however, mostly fiscal but also creating regulatory bodies handling E&P[6], has not kept pace and been entirely inadequate[7].

In the electricity industry, the “single buyer” model that came from the reform of 1992[8], has seen results, occasioning the entry of new actors in power generation and recording significant achievements through new contractual and financial schemes like that of the “independent producer.” Participants in the latest auctions have diminished, however, which may signal a drying-up of these initiatives or lack of confidence in them. Investment incentives thus become a central theme. There are proposals that the Federal Electricity Commission (CFE) assume again the whole responsibility of investment, which would mean a return to pre-1992 policy. Others advocate legal security for private investors so that they become serious partners in the development of the industry. In the latter case the uncertain legality of power-generation permits, and the possible unconstitutionality of several provisions of the Public Service Electricity Law in force since 1992, are not helpful, and it is necessary to modify the law or the constitution. The constitution must clearly establish the limits of public and private sector activity so that it can effectively regulate them.

While electricity has undertaken various reform initiatives, the natural gas industry has not seen serious proposals that can resolve supply problems (production and reserves) given the foreseeable tendencies of demand, especially from the electricity

sector itself. Hydrocarbons companies were ready to come if they have been clearly invited to bid on dry natural gas development projects “Multiple service contracts” that were meant to increase production have not had the desired result, above all in attracting the interest of international oil companies (majors), and are likewise subject to legal uncertainty. There is talk that liquefied natural gas would, in the short and medium term, offer a partial solution to supply and demand inefficiencies, and have the double objective of meeting internal consumption and re-export to the US market. This solution requires clear definitions pertaining to the installation of regasification units in strategic locations, with corresponding pipelines that would connect to the national system, contribute to improved regional distribution, and facilitate possible re-export. Both the selection of installation sites and the participation of private sector companies, however, have excited passions that could in some moment erupt in a conflict of legal or environmental nature, or even raise questions of national sovereignty.

The use of renewable energy in Mexico, according to the Energy Research Center (National Autonomous University of Mexico, 2004), “is greatly inferior to its potential,” an assessment confirmed by the *Balance Nacional de Energía* whose data indicate that only 11.66 percent of the gross domestic energy supply originates from these sources. Some studies conclude that this percentage could go up to 20 percent in 10 years, if serious efforts are realized in wind, solar, hydroelectricity, biogas and biomass. To develop new technological opportunities that provide a cleaner, more diversified, and more sustainable energy future, an adequate institutional and regulatory structure is indispensable. In this area too, the Mexican institutional and regulatory framework is inferior to those of other countries, including in Latin America.

In order to move forward with the huge task of institutional and regulatory reform, it is urgent to pose the right questions while leaving aside others that are not central to advance the debate:

- Can a progressive opening of the electricity market be accomplished in Mexico under clearly defined and differentiated stages?
- Should the oil industry reorganize with three principal players: Pemex, service companies, and international oil companies?[9] Can Pemex face domestic competition given more flexible rules governing E&P activities? What fiscal structure would be most appropriate to maintain government revenues while defining clear rules for private sector participation in determined areas?

Changes in Mexico, gradual and in clearly defined stages, need a precise distinction between a more efficient administration of public sector companies – which depends greatly on a profound change in their relationship with the government – and the entry of new participants. If its existing relationship with the government does not change, competition will prove very unfavorable to the public entities. Unlike large state players in various other countries, organizations like Pemex and CFE cannot currently be considered autonomous industrial companies operating in a competitive environment and responsible for their accounts and results.

The recent experience of the electricity industry in many countries has shown that radical privatization and deregulation do not prevent inefficient administration and chronic under-investment. This model has not avoided grave problems of under-capacity and uncontrolled rent-seeking by private companies. The current theme in the Latin American countries in which some of the most radical measures

have occurred is to “reform the reforms” by finding solutions more suitable to the conditions of each country, to the problems of institutional weakness, and to the need for enormous investments in infrastructure.

As for the oil and gas industries, a middle ground must be sought in order to permit better exploitation of resources. The eventual participation of private domestic or foreign companies (the latter, for example, in deepwater E&P), will allow better access to capital and technology and introduce public sector companies to competitive pressure.

However, public companies, and the government itself, still play an important role in the general leadership of the energy sector and in specific segments such as E&P and commercialization of oil and gas. This important role causes a real problem: how can openness be made credible when new entrants must compete with two giants (Pemex, CFE) having a dominant position in their respective energy field?

These and other problems have to be addressed in order to contribute in answering a crucial question: is it possible to design gradual reforms that achieve results and confront the deficiencies of state-run models? What seems very clear, concerning Mexico, is that it is no longer conceivable to return to these models.

Notes

1. State ownership of energy assets is a characteristic of Mexico’s energy sector. According to the constitution (Article 27) the nation has a permanent and inalienable right to all subsoil resources of the country. Since, the 1938 nationalization, Pemex, a state-owned company, holds a monopoly on natural gas exploration and production (E&P) and is the sole operator in this realm. Mexico’s six refineries are all operated by Pemex. Another state-owned entity, CFE, is the dominant player in the generation sector and holds a monopoly on electricity transmission and distribution in most parts of the country. These national entities, the dominant actors in the energy sector under certain control or the Ministry of Energy, employ around 250,000 workers.
2. Gas consumption for electricity generation amounted to 35.9 percent in 2004 and will represent 45.4 percent in 2014 assuming that it grows at an annual average rate of 7.7 percent.
3. Pemex’s operations were divided in 1992 into four subsidiary entities: Pemex-exploration and production; Pemex-refining; Pemex-gas and basic petrochemicals, and Pemex-petrochemicals.
4. The union of oil workers (STPRM) is a powerful remnant of the old Mexican corporatist system.
5. The Cantarell complex in the Bay of Campeche is Mexico’s largest known oil deposit. The field represents around 50 percent of Mexico’s current production and 60 percent of its reserves. Nevertheless, oil production recently peaked and has begun to decline.
6. As oil and gas investments have been until now closed to foreigners, there is no regulatory body in Mexico for E&P activities. Pemex has typically mixed its operational and regulatory responsibilities (“Pemex, an auto-regulated monopoly”). But if Mexico continues to open in an attempt to incorporate private players, it will certainly need an autonomous regulatory body.
7. The downstream natural gas sector was opened to the private sector in 1995 and, in that same year, the Energy Regulatory Commission was created. Recently (2003), a certain amount of flexibility was introduced in gas E&P with multiple service contracts intended to ensure compatibility with Mexico’s constitution (Pemex pays cash for these services).

8. This reform opened the generation sector to private participation in some cases (IPPs, autoproducers, cogenerators) but does not establish an electric market.
9. International oil companies have not come back to Mexico since the 1938 nationalization.

References

In recent years, many published and unpublished papers have studied the Mexican energy reform, its possible path and characteristics. A lot of this investigation comes from government departments, newspapers and academic research. It is not possible to enlist all the existing material, but it could be useful to provide some references from different perspectives and also some sources of energy statistics.

Secretaría de Energía (SENER). SENER, the equivalent in Mexico of a Ministry of Energy has published important prospective studies on different fields for the period 2005-2014: electricity, natural gas, oil products, LPG. Those studies have often provided the justification for the government reform proposals.

Further reading

- Auer, M. (2001), "Energy and environmental politics in post-corporatist Mexico", *Policy Studies Journal*, Vol. 29 No. 3.
- Carreon Rodriguez, V., Jimenez San Vicente, A. and Rosellon, J. (2003), "Mexican electricity sector: economic, legal and political issues", Program on Energy and Sustainable Development Working Paper No. 5, November, available at: http://iis-db.stanford.edu/pubs/20311/WP5_10_May_2004.pdf
- De la Vega Navarro, A. (2005), "Energías. De los diagnósticos y escenarios a las nuevas construcciones institucionales y regulatorias", *Economíaunam*, No. 4, pp. 7-26.
- De la Vega Navarro, A., Queiroz Pinto, H. Jr and Finon, D. (2004), "Energy, institutional reforms and development in Latin America – introduction", *OGEL (Oil, Gas, Energy Law)*, Vol. 2 No. 3, Special Feature on "Energy, institutional reforms and development in Latin America".
- Lajous, A. (2005), *Mexico: Oil Policy Issues*, Kennedy School of Government, Harvard University, Cambridge, MA, June 27.
- Lajous, A. (2006), "México: Producción y reservas de petróleo y gas natural", *Este País*, Septiembre.
- National Institute of Statistics Geography and Informatics (INEGI) (2005), *El Sector Energético en México*, Serie de Estadísticas Sectoriales, INEGI, México City, p. 303.
- Pemex (2006), *Statistical Yearbook 2006*, Pemex, Mexico City, available at: www.pemex.com
- Rodríguez Padilla, V. (Ed.) (2002), *La industria eléctrica mexicana en el umbral del siglo XXI. Experiencias y propuestas de reestructuración*, Facultad de Ingeniería, Universidad Nacional Autónoma de México, México City.

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