The Void of Governance: An Assessment of Pemex's Performance and Strategy

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About the National Oil Company Study

While the role of the state is declining in nearly every sector of world economic activity, in hydrocarbons the pattern is quite different. State-controlled oil companies—so-called national oil companies (NOCs)—remain firmly in control over the vast majority of the world's hydrocarbon resources. Some NOCs are singular in their control over their home market; others engage in various joint ventures or are exposed to competition. PESD's study on National Oil Companies focuses on fifteen NOCs: Saudi Aramco, NIOC (National Iranian Oil Co), KPC (Kuwait Petroleum Co), PDVSA (Petróleos de Venezuela) , ADNOC (Abu Dhabi National Oil Company), NNPC (Nigerian National Petroleum Co), PEMEX, Gazprom , Sonatrach, CNPC, Petrobras, Petronas, ONGC, Sonangol, and Statoil.

These enterprises differ markedly in the ways they are governed and the tightness of their relationship with government. NOCs also vary in their geological gifts, as some are endowed with prodigious quantities of "easy" oil while others must work harder and apply highly advanced technologies; some have sought gas, which requires different skills and market orientation than oil, while others stay focused on liquids. These case studies explore whether and how these and other factors actually explain the wide variation in the performance of NOCs.

About the Author

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Part I: INTRODUCTION

Mexico's oil company Petróleos Mexicanos, better known as Pemex, is the oldest of the important state-owned national oil companies (NOCs). Mexico nationalized its oil industry in the 1930s, long before countries in the Arab world were expropriating foreign companies' oil assets and converting them to national resources. Today, Pemex is a major oil supplier that is extremely important for both Mexico and the global oil market. Mexico is the second leading supplier of all U.S. oil imports (behind only Canada and ahead of Saudi Arabia) and in Mexico itself, the government depends heavily on the vast oil revenues that the company accrues.

But despite its long history and current importance, Pemex is a deeply troubled company. Its business strategy is often questioned; its economic efficiency does not compare favorably to other NOCs and fares even worse when compared with globally-oriented independent oil companies (IOCs).

Pemex today is managing the consequences of a decade-long strategy that has focused on maximizing short-term revenues. That strategy was initially pursued under pressure from the government, which needed the revenues to cover holes in the national budget at a time of low oil prices. Since then, the company has focused on sustaining production—making extensive use of subcontracting in all oil production projects—to maximize output from productive oil wells as fast as possible. In short, it is running faster just to stay in place, while it invests relatively little in finding new production fields.

The strategy has worked by the metrics implied in the government's original mission: it has provided lots of money to the Mexican government and allowed an increase in social expenditures for the Mexican people. But it has also given rise to many criticisms. Some are calling for Pemex to update and extend its own internal expertise rather than rely so much on expensive subcontractors. Others decry the extremely inefficient, outdated, and weak performance of its neglected operations beyond

mere crude production—in particular, refining, natural gas, and petrochemicals. And there are growing warnings of a looming decline in oil production because Pemex has been so focused on extraction while investing relatively little in new exploration. The new fields that are available to the enterprise require technical expertise that the firm does not have at hand. This could develop into a major national crisis in the near future. The crisis could also come about from a simple drop in oil prices or a rise in production costs, as Mexico's government is overly dependent on its taxation of Pemex's profits.

Thus, the company has had enormous revenues over the past decade (ranking 34th on Fortune's "Global 500" list of all companies worldwide in 2007), but is actually cash strapped and, according to normal accounting practices, has been running billions of dollars in *losses* for the past several years. Worse still, the company does not retain any of its earnings for internal reinvestment. Its capital expenditure (which these days includes over $10 billion a year, predominantly destined for production activities) is funded almost entirely by debt that is backed, implicitly, by Mexico's sovereign credit rating – itself part of a government funding scheme that expands government borrowing by providing an increasingly dangerous level of sovereign guarantee and relying on the fact that debt markets are particularly attracted to Pemex's oil revenue stream as surety for the bonds they buy.

Overall, Pemex is struggling to break even despite a period of record revenues, as all of its surplus is transferred to the government while, at the same time, striking debt levels are being amassed. Added to these drains is a high cost base, driven in part by overstaffing and overly generous benefits and pensions for its workers, who are defended by a union that is exceptionally powerful thanks to its enshrined role in Pemex's governing board and close ties to the country's traditional ruling political party.

The current operating picture is bleak, but the future appears to be even worse. The company will need to repay accumulating debt; it faces an imminent and possibly sharp drop in oil production, its traditional source of most revenues; and it has proven incapable of building an economically viable industry in refining, petrochemicals, or natural gas that might partly offset the terrible outlook for crude oil production. A fragmented political system in Mexico further complicates matters and impedes meaningful reform. (At the time of this paper's release, President Felipe Calderon had recently submitted a reform bill to the Mexican Senate aiming to expand Pemex's ability to partner with foreign companies to develop offshore reserves and domestic refinery capacity, though the bill's proposals stop short of true risk sharing so as to stay within constitutional restrictions on foreign ownership and avoid politically explosive charges of privatization.)

The remainder of this paper explores Pemex's performance. It seeks to explain the firm's

strategy (which concentrates on generating short-term revenues through crude exports and a de-emphasis on exploration for new fields) and economic efficiency (and the associated poor overall economic performance). Several potential explanations emerge to account for the company's shortcomings in performance. They are briefly summarized below:

First, Pemex has a difficult and complicated relationship with all branches of the Mexican federal government, including the President, the Congress, and various ministries in the large federal bureaucracy. The net effect is that Pemex's managers are effectively stripped of much of the responsibility and accountability that comes with running such a large company—they are unable to pursue an optimal investment strategy because they have neither the capital resources nor the autonomy to make intrinsically risky investment decisions on commercial merits. While that lack of autonomy is shared in many other NOCs, what distinguishes Pemex is that political fragmentation in Mexico has meant that no single actor or entity in the Mexican government can actually assert political control or maintain strategic oversight of the company. Thus, Pemex suffers the worst of both worlds: managers stripped of autonomy by the government, and a government that cannot efficiently control the company. What the government does impose on Pemex, however, is the strategic focus on maximizing short-term revenues. The Mexican style of public administration has come to be dominated by well-educated economists who seem to have a macroeconomic focus and are willing to sacrifice Pemex's status as an energy company and turn it into an instrument for the state's financial engineering. In practice, that has put Pemex at the forefront of a scheme to contract debt ("Productive Infrastructure Projects with Deferred Expenditure Impact" known by its acronym PIDIREGAS) and also caused government managers to view Pemex as a supplier of cash needed to stabilize the Mexican economy. All of Pemex's capital expenditures are reviewed by the enterprise's masters in the Finance Ministry – known as Hacienda – who know little about long-term investments in technical and production capabilities in the oil industry and the need to embed such investments in a risk management framework.

Second, the company's strategy and economic performance are deeply influenced by the tax and budget regime under which it must operate. The tax system, in effect, strips the company of surplus revenues. Pemex alone finances almost 40% of Mexico's entire federal budget. Impoverished, Pemex must negotiate its budget with the Mexican government on an annual basis and is unable to contract for debt or other financial services directly with the marketplace. It is this regular financial dependence on

the federal government (in addition to the government's control over senior appointments) that gives rise to the complex and indeterminate relationship with Pemex's political masters. The federal budget is simply too dependent on short-term revenues from Pemex to give the company financial autonomy – even though the resulting strategies and economic performance are not in the best long-term interests of Pemex, the government, or Mexico. This co-dependence between Pemex and the government's finances would be lessened if the country were successful in restructuring its overall income and corporate tax system, but until recently that has proven politically impossible due to the highly fragmented political control prevalent in Mexico.

Third, Pemex faces tight legal constraints that have broad negative practical effects on its strategies. The Mexican constitution and other laws make Pemex the exclusive oil operator in the country. That makes the firm, unlike many other NOCs, unable to pursue domestic joint ventures or other equity contracts, as these would violate the Mexican constitution and, moreover, are politically volatile as they are seen as extinguishing Mexico's natural patrimony. Instead, Pemex relies on subcontracting as the only means of partnering with other oil companies. But that means its partnerships disproportionately focus on field services activities rather than the larger joint ventures that could bring whole systems of technology and management into the country and which would provide Pemex with internal benchmarks for improving performance. This practice elevates the company's cost base because it lacks the internal expertise (both technological and professional) to manage its own production-related projects; nor is it able to manage its many contractors effectively. In addition, Pemex is subjected to debilitating procurement rules, imposed by a watchful and distrustful government, making it hard for the company to follow a wise procurement strategy. Unlike some other NOCs (such as Brazil's Petrobras or Norway's Statoil, which are seen by some in Mexico as "model" NOCs), Pemex has no overseas partnerships (except for one refinery in the United States), which makes it even harder to learn from its peers in the industry. Overall, the strategy of partnering with other companies only through subcontracting has led to the deskilling of Pemex itself. The human capital base, for one, has declined markedly; whereas the company used to be the most attractive employer in the country – attracting the best engineering graduates – it no longer holds that position. In contrast with the in-house R&D system at Petrobras, Pemex's own internal R&D system is a shadow of its former self.

Fourth, Mexico's geology accounts for part of Pemex's current predicament. Ever since the

discovery of the Cantarell oil field in the 1970s, Mexico has been able to produce large quantities of crude oil with relative ease. Cantarell has proven exceptionally generous and for a full two decades Pemex did not need to invest in new infrastructure or advanced technologies in order to generate large revenues. When production finally started to drop, Pemex needed help to keep the aging oil field productive – it did so with a highly successful secondary recovery program (itself executed through subcontracting for the work and borrowing for the financing). However, that project only delayed the decline and has set the firm up to face an even steeper dropoff in production evident today, as the field approaches the end of its life.

Fifth, and finally, Pemex is hindered at attempts to improve its performance – in both strategy and economic efficiency – by a volatile combination of public perception and an extremely powerful workers' union. In 1938, Pemex was the first NOC to be expropriated, and that event has retained its nationalistic salience for seven decades. This durable role of Pemex in Mexican society explains why the public, although generally dissatisfied with the enterprise's day-to-day performance, is also hostile to significant reforms that would boost performance. Public suspicion is especially aroused by ruminations about joint ventures or even a partial opening up of the sector for fear that these are a pretext for privatization. The workers' union fans these concerns as part of a strategy to maintain the status quo—even though the union, itself, plays a large role in contributing to the company's poor performance though corruption, excessive employment, and overly generous contracts.

Part II: A SHORT HISTORY OF PEMEX

1) Early History of Mexican Oil (1900-1938)[1]

Mexico was one of the world's first important oil producers. Significant oil exploration and production began in the country as early as the 1880s. By 1921 Mexico was the world's second leading oil producer, accounting for 25 percent of the world's output of petroleum. However, over the next decade, Mexican oil production began to fall off due to the difficulty of developing additional production with the technologies available at the time. By 1930, output was only one-fifth the 1921 levels and Mexico represented only 3 percent of world production. Mexico would not regain the 1921 levels of production until 1974. Nevertheless, investment in Mexico's oil industry continued and the country produced significant amounts of oil for several decades to come.

In the early years, Mexican oil production was organized and controlled by American and British companies – a period also marked by the Mexican Revolution, several civil wars, and political instability. But even in those days, starting with the Constitution of 1917, oil and other subsoil wealth were declared to be the property of the nation. Whatever governments were in power (at times there was more than one "national" government) granted certain rights to this national property to the foreign oil companies while trying to extract as much oil rent as possible in order to fund military actions and other projects intended to preserve political power. In general, the oil industry did not align with any one of the many competing factions during this turbulent period in Mexico's history.

2) The Early Years of Pemex (1938-1974)

By the 1930s, Mexican oil production was firmly in decline and the industry was still controlled by outside companies that operated, in the view of Mexico's president Lázaro Cárdenas, as entities to themselves. In 1937, he stepped in to mediate a conflict between the foreign companies and oil workers that had gone on strike. After a long series of failed negotiations, Cárdenas felt like he was being marginalized and ignored by the British and Americans. Taking personal insult at the way he was being treated, President Cárdenas took the oil companies by surprise when he followed through on a threat to

[1] Good background on the birth of the Mexican oil sector can be found in Haber, Maurer, and Razo. Our separation of the sector history into distinct periods follows Sosa-Garcia.

expropriate the entire industry.

Immediately following expropriation, the government founded two new companies (both with the name Petróleos Mexicanos, "Pemex"): Pemex Distribution and Pemex Production. In 1940, Pemex Production acquired Pemex Distribution and the government's monopolization of the oil industry was complete. At the same time, the government set an inward domestic strategy for the company, as Pemex was charged primarily with satisfying domestic demand for oil products. In this respect, Pemex differs from many other NOCs – notably the companies in the large oil producing countries of the Persian Gulf – in that it did not start out as export-focused and was not created in order to be a mass source of revenues for the government. Like Brazil's Petrobras, Pemex's original focus was domestic.

Pemex survived its early years despite the difficulties the government faced in reorganizing the entire production of oil, educating an unskilled labor force, and consolidating the properties and activities of the many foreign companies into one state entity. These challenges were made worse by the constant diplomatic pressures and threats of foreign governments, particularly Britain, over the expropriation.[2] True to its orientation to the domestic market, Pemex constructed three new refineries in the 1950s even as crude oil production continued to decline – to a point where in the late 1950s it became a net importer. Facing a crisis sustaining its crude supply, Pemex invited American companies back in Mexico for exploration purposes.

During the 1960s, several important new oil fields were discovered and Pemex began to make significant investments in infrastructure in order to develop them and boost sagging production. These investments were financed by issuing internal debt and the government, once again, prohibited foreign companies from conducting exploration activities in the country. Instead, it sought to promote domestic capabilities by founding a research arm for Pemex: the Mexican Petroleum Institute (IMP)

It was also during this time that Pemex became an elite, super-agency the government used to promote a wide range of economic and social objectives related to Mexican development. Pemex, in combination with the state electrical utility CFE – another state champion – performed nearly all the interesting engineering and technology-related work in the county. This included not just oil production, but also the building of roads, ports, rails, and even company towns and hospitals. While the company was not overly efficient, it was effective, and it was the employer of choice for young, competent engineers who could count on steady, well-paid employment and opportunities to do

2 While U.S. companies like Standard Oil were also outraged by the expropriation and continued to press the U.S. government for action in the years to come, there was generally much more sympathy for the Mexican government's position and actions in the U.S. than in Britain. The U.S. government at the time was much less sympathetic to the interests of the energy industry and inclined to favor a more state-driven model of economic development.

interesting and meaningful work (PESD Interviews 2006-2007).

3) Pemex after 1974

With encouraging signs from the oil discoveries of the 1960s and the technological development of Pemex and the country, the Mexican government decided in 1974 to re-start Pemex's oil export business. This was a time of high worldwide oil prices and the government stood to make enormous revenues if it could successfully exploit the nation's oil resources. At this time, further Pemex production expansion began to be financed by external debt and a full seventeen percent of federal budget expenditures were dedicated to Pemex oil exploration. With the discovery of the huge Cantarell oil field in 1976[3], the country seemed to have struck gold. There were high hopes for rapid national development and improvement in quality of life thanks to oil revenues.

These hopes were dashed by the twin crises of the early 1980s—first the macroeconomic shock caused by the global economic recession (itself partly triggered by the surge in oil prices following the Iranian Revolution and the Iran-Iraq war and mainly caused by the efforts of central bankers to tame inflation) and then the collapse in oil prices. Together, these crises helped spark a foreign debt crisis in Mexico that by 1985 had produced a deep and sustained financial crisis. Like much of the rest of Latin America, the 1980s wound up becoming a "lost decade" for Mexican's economic development. The country, wracked by economic stagnation, had no choice but to use its oil industry to refinance and service its debt. Large-scale and long-term investments in technology and infrastructure were shelved as unaffordable. The 1990s saw a partial turnaround in Mexico's fortunes – triggered notably by NAFTA – but Pemex's fortunes did not improve because the firm had come to play a central role in the Mexican state budget.

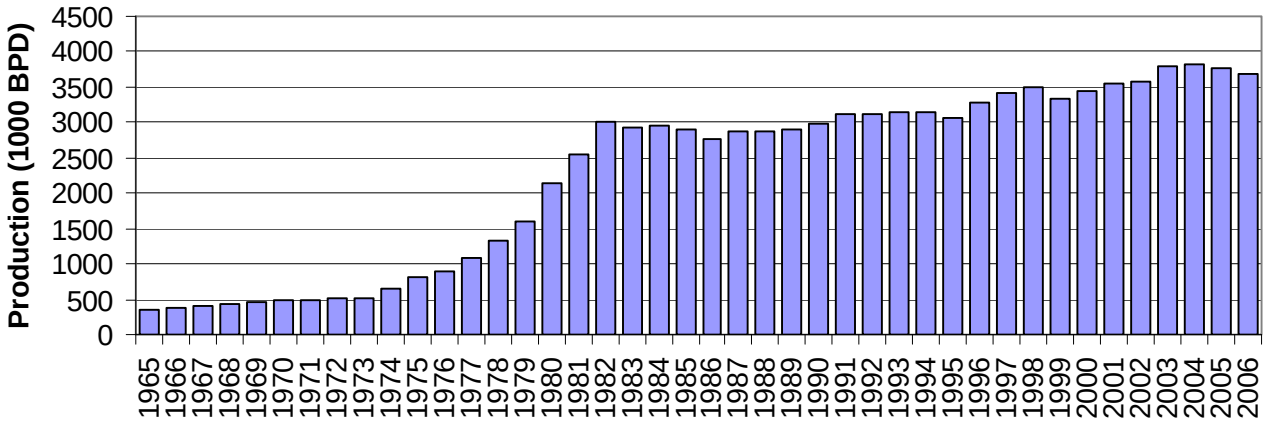
For nearly two decades, Pemex operated with minimal investments and aging infrastructure, which eventually contributed heavily to the loss of its engineering talent and saw a shift in the firm's culture away from performance. Nevertheless, Pemex continued producing oil from Mexico's rich and easily accessible oil fields in order to supply the country with fuel and repay its debt (see Figure 1). With oil prices low in the 1990s, Mexico's Ministry of Finance and Public Credit ("Hacienda") decided

3 Ironically, this most important of all Mexican oil fields was not discovered by Pemex's large-scale exploration activities of the era, but was instead accidentally stumbled upon by a fisherman who noticed oil bubbling to the surface in the areas he was fishing.

to restrain production (PESD Interviews 2006-2007). Even though Pemex, at the time, had excess capacity to produce, the finance ministry did not want to either expand (because of low prices) or curtail (because of having to pay back debt) production. In addition, Hacienda did not approve of any infrastructure investments or other capital expenditures for Pemex other than the minimal ones needed to keep up the exact target production levels.

It was not until another crisis – the recovery from yet another Mexican financial crisis in the mid-1990s and, crucially, the looming threat of imminent decline in crude oil production (and therefore government revenues) – that Hacienda allowed new large-scale investments in production (and, eventually in 2003, in new exploration). In particular, in 1996 Pemex management decided to undertake a large-scale nitrogen injection project at Cantarell that significantly expanded its production. That decision was taken at a time of low oil prices and, fortuitously for Pemex and the Mexican budget, allowed the company to carry higher oil production into the runup of oil prices in the early 2000s. For Pemex's corporate leaders, though, the strategy in the middle 1990s was simply to maximize the present value of Pemex's productive assets – which really only maximized revenues to the government.

Figure 1: Mexican Oil Production (1965-2006)
(Source: BP Statistical Review of World Energy 2007; Pemex 2008)



4) Public Perception & Legacy Assets

One of Pemex's biggest assets throughout its almost seventy-year history has been its status as a national symbol. The “Expropiación Petrolera” – the date that President Cárdenas stood up to foreign

interests and nationalized the oil industry – is one of the major national holidays (Fiestas Patrias) of Mexico. School books still refer to the expropriation as "the great conquest". While Pemex's nationalistic sheen is wearing off, Pemex's national significance remains very high and the masses overwhelmingly oppose any privatization or hints of opening up the sector to foreign involvement (PESD Interviews 2006-2007).

Thus, even more important than an analysis of the origins of national fervor over Pemex is the question of why that almost religious fervor has persisted in Mexico over all these decades. One obvious answer is that Pemex was part of a one-party government rule in Mexico (by the PRI political party) for almost its entire history. The one-party system made it much easier to perpetuate national symbols, and it was hard for politicians or anyone else to criticize or reform Pemex when all the politicians were a product of the same system.

The end of PRI's monopoly has been healthy for Mexican debate, but new approaches to organizing the economy will diffuse into practice only slowly. News of Pemex's poor performance has not spread widely outside the "circulo rojo" of academics, intellectuals, columnists, and others who make commentaries in newspapers and magazines and some radio and television editorials. In addition to poor performance, there are rumblings in both elite and popular opinion about corruption at Pemex – amplified by episodes such as the "Pemexgate" scandal of 2001 (PESD Interviews 2006-2007). Regardless of these blemishes, the recent renationalization experiences of Bolivia and Venezuela are widely seen in Mexico as "evidence" that the Mexican approach to national oil without the involvement of foreign companies always was and still is correct.

This broad public support for keeping Pemex intact as a state company is just one of several factors that make Pemex dificult to reform. A second and related historical legacy is the absence of foreign participation in the oil sector. Many other countries that have expropriated their oil industries have nevertheless allowed IOCs back in, either in joint ventures with the NOC or even in direct competition with the NOC. International benchmarks for assessing performance quickly follow. This simply has not happened in Mexico, as foreign firms have not been allowed to produce or deliver Mexican oil since 1938 and have been excluded from exploration activities (other than through recent, carefully constrained subcontracting by Pemex) since the 1960s.

Finally, at several points in its history (most notably its founding, the drops in production of the 1950s, and the oil crises of the 1980s), Pemex has shown a tendency to overcome the odds whenever its demise has been predicted. The company today once again finds itself facing a crisis, and the central strategy envisioned at Pemex and the government is to just tough it out yet again and resolve this

problem without the need for large-scale foreign participation.

Part III: MEASURING PEMEX'S PERFORMANCE

1) Strategy

Pemex strategy has been dynamic over the decades, but a long-time primary mission has been the secure delivery of hydrocarbon energy to the Mexican people. Whether this required selling gasoline to consumers at below market levels or huge subsidies in fuel oil for the electricity sector, Pemex was, for most of its history, in the business of assuring reliable supplies to Mexico. Because that mission was a highly political one, Pemex's strategy has emphasized the delivery of energy services with minimal participation of outside firms.

The government broadly shares Pemex's traditional goals. Figure 2 lists the last government's formal strategic objectives for the Mexican energy sector (i.e. Pemex and two state owned electricity companies) as stated in the "National Energy Sector Program (2001-2006)" released by the Fox administration's Energy Ministry (which, for a time, was headed by the current Mexican President, Felipe Calderón). With the failure of most of that administration's dreams for reform, the energy sector is guided today by a less crisp vision.

Nevertheless, the government's long-term vision for Pemex can be seen as consisting of three parts. The first is the continued guarantee of full access to energy at competitive prices for the Mexican population. The second is for Pemex to appear and act as a competitive international energy company. This includes operating within an adequate legal and regulatory framework, using energy efficiently, promoting the use of renewable energies, protecting the environment, and encouraging R&D in order to "maintain the energy sector updated with the most advanced available technologies." The third part of the long-term vision is to maximize Pemex's profits "for the benefit of all the Mexican population."

Figure 2: Strategic Objectives of the Mexican Energy Sector:
(Source: Energy Ministry "National Energy Sector Program (2001-2006)")

1. Guarantee a reliable energy supply, according to international quality standards, and competitive prices.
2. Adequate legislation as an instrument for the development of the energy sector.
3. Enhance the participation of Mexican enterprises in energy infrastructure.
4. Improve energy efficiency programs and development of renewable energies.
5. Foster a safe and reliable use of nuclear energy maintaining the highest safety international standards.
6. Leadership in risk prevention of the productive operations of the energy sector.
7. Leadership in the protection of the environment.
8. Promote the development and application of advanced science and technology.
9. Expand and foster international cooperation on energy matters.
10. Improve service quality.

Unfortunately, nobody really has a viable plan to achieve all those goals, and thus in practice, Pemex and the government largely muddle through with "reforms" at the margin.[4] And if recent activities are any indication, Pemex and the government are, in practice, focused mainly on the third part of this vision – maximizing revenues for the national coffers. This means that there has been a significant shift in strategy for the company, particularly over the last 15 years or so, going from the traditional strategy that focused on delivering energy to Mexican consumers to a strategy centered on maximizing pre-tax profits (PESD Interviews 2006-2007).

Pemex's shift in strategy is most clearly evidenced by its recent allocations of investment capital. A cursory glance at the company's capital expenditures breakdown (Figure 3) reveals that resources are funneled towards activities with the greatest return on capital, that is, crude oil production. By contrast, for example, the company's refining operations remain significantly underdeveloped even after some substantial upgrades and investment over the past five years. Company insiders say that today, funds are allocated to maximizing expected values of projects.

4 For example, Hacienda is allowing Pemex to keep a slightly larger fraction of its revenues for internal investment; and the Energy ministry is building up its capacity, at least in theory, to regulate the hydrocarbon sector. But these are changes at the margin that do not go a long way towards reaching the long-term plans for Pemex.

Figure 3: Allocation of Capex (in % total capex) by Operating Subsidiary*
(Source: Pemex Statistical Yearbook 2007)

	Exploration & Production*	***Refining***	***Gas & Basic Petrochemicals***	***Petrochemicals***
1996	71%	21%	4%	2%
1997	72%	16%	9%	2%
1998	75%	14%	8%	2%
1999	78%	13%	7%	2%
2000	63%	30%	5%	1%
2001	84%	10%	4%	2%
2002	78%	17%	2%	2%
2003	78%	17%	3%	1%
2004	92%	4%	2%	1%
2005	89%	7%	3%	1%
2006	86%	10%	2%	1%

* For a full explanation of the activities of each operating subsidiary, see "Corporate Structure" later on

** Includes upstream operations in *both* gas and oil

While joint ventures and other equity partnerships are constitutionally prohibited, Pemex nevertheless has extensive interactions with other oil companies – mainly field services companies. In particular, it contracts out a large portion of its upstream field services work in order to capture as much value as possible from production activities where it lacks the expertise to fully exploit its resources. It appears that Pemex has become so dependent on these companies that it even lacks the knowledge inside the company to manage these contracts for maximum economic efficiency. Over the years, Pemex has awarded billions of dollars in contracts for diverse upstream activities such as major offshore drilling projects, shallow-water area oil and gas infrastructure construction, data gathering, geological surveys, water control, gas injection services, and even construction of offshore living quarters for employees. More recently, Pemex has moved away from its almost exclusive focus on maximizing production from known fields and begun awarding large contracts for exploration

activities, where it also lacks the necessary expertise to complete projects on its own. In its upstream gas operations, Pemex has made extensive use of so-called multiple service contracts (MSCs) where it essentially outsources the entire exploration and development of gas fields to other companies. The constitutional validity of MSCs, however, is in doubt and Pemex will need to make some changes before it can use them in its oil operations without looming danger of invalidation by the courts.

By contrast, Pemex invests very little in the low-return activities of its other subsidiaries: Refining; Gas & Basic Petrochemicals (which does *not* include upstream gas activities); and Petrochemicals. In fact, the company has already divested a large part of its traditional downstream gas operations and at one point had hoped to do the same with its entire petrochemical subsidiary (see "Part IV: 2: Internal Structure and Operations" below). Partnerships and subcontracting with other companies in these activities are minimal when compared to Pemex Exploration and Production (E&P), with the only notable partnership being a joint venture with Shell in a refinery in Texas (where Shell is the operator).

Overall, Pemex's current investment strategy has succeeded in providing large sums of money for the government. Pemex's crude oil production operations are amongst the most important economic activities in Mexico. By 2002, oil-related taxes contributed between a third and 40% to the federal budget year after year. Crude oil alone represented 8% of the total value of Mexican exports. Success on this front, however, may be compromising Pemex's traditional focus of supplying affordable and reliable energy to Mexico, particularly as domestic economic and demographic growth continues. The current strategy also makes it difficult to transform Pemex into a competitive and accountable entity (part two of the government's long-term vision). As explored below, however, legal and regulatory constraints seem to have left management with little room to adjust the current strategy. Nor do managers, for their part, seem to desire a shift in strategy that would take them away from maximizing the present cash flow of E&P operations. For now, therefore, it seems unlikely that any major shift in strategy will be forthcoming.

2) Financial Overview

As far as financial performance goes, Pemex's annual reports over the past decade show it making only minimal profits or running at a loss. Figure 4 summarizes Pemex's key financial indicators over the past few years, as reported in the company's consolidated financial statements. These "bottom line" figures are highly misleading, however, as Pemex is neither poor nor bankrupt. On the contrary,

Pemex is a Fortune "Global 500" company that in 2007 ranked 34th in pre-tax revenues of all companies worldwide. In 2004, it was the 3rd-ranked petroleum company by crude oil output (Energy Intelligence 2006), and it continues to be one of the most profitable petroleum companies before taxes. The reason its final numbers are dismal lies with its heavy tax burden – in 2005, for example, the massive government take pushed Pemex into a significant loss. Government tax reforms that took effect in 2006 have perhaps begun to lighten the load somewhat, allowing some positive income for that year.

Figure 4: Key Financial Indicators for 2003-2006, in billions of Mexican pesos as of December 31, 2006 purchasing power (Source: Pemex Annual Reports 2005 and 2006)

	2003	***2004***	***2005***	***2006***
Net Domestic Sales	438	483	526	547
Net Export Sales	270	349	441	516
Other Revenues	3	12	12	70
Total Revenues	**711**	**844**	**979**	**1132**
Cost of Sales	234	284	376	403
Transportation and distribution expenses	18	19	23	24
Administrative expenses	40	39	49	54
Total Operational Costs	**292**	**342**	**447**	**481**
Financing	**(35)**	**(8)**	**(5)**	**(23)**
Net Income Before Taxes	**384**	**494**	**527**	**628**
Hydrocarbon extraction duties and others	326	412	519	566
Excess gain duties		37	59	8
Hydrocarbon income tax		–	2	5
Income tax		2	4	4
Special tax on production and services (IEPS)	106	59	21	–
Total Taxes and Duties	**432**	**510**	**604**	**583**
Adoption of new accounting standards	**2**	**(11)**	**(2)**	**–**
Net *Loss* For Year	**(46)**	**(27)**	**(79)**	**45**

Part IV: EXPLAINING PEMEX'S PERFORMANCE

1) Governance

Since 1917, the Mexican Constitution has explicitly stated that oil and other subsoil wealth are the property of the nation. In the years after the oil industry's nationalization in 1938, Pemex was entrusted with complete and exclusive planning and management of Mexico's hydrocarbon resources. Thus, policy and operations became integrated and, with time, those became grafted to the financial planning apparatus of the entire government. The Mexican federal government oversees Pemex and has the power to completely set the company's agenda.[5] When the PRI was in control of Mexico's one-party system there was continuity in control over both Pemex and government; political liberalization, however, has brought much greater uncertainty to the government's control over the firm. Following the year 2000 elections, the Congress (which tightly monitors and approves Pemex's annual budget) and Presidency (which appoints Pemex's CEO as well as the majority of its directors, and also controls the Finance Ministry, which administers Pemex's budget) were for the first time controlled by rival political parties. At the same time, Pemex was increasingly hamstrung by regulations from several ministries in the vast Mexican bureaucracy. The result was that Pemex itself spearheaded the push for major reforms – a pattern that is unique among the NOCs in our study. However, fragmentation in Mexican politics and the general weakness of President Vicente Fox's administration meant that Fox ended his six-year term without any significant reforms in governance. Throughout his term, Congress set a negative and non-compromising tone for the few "battles" over Pemex – and Fox quickly folded in the face of opposition. The major government-linked impediments to strong company performance thus remained in place for the Calderón administration to address.

1.1 Petroleum Sector Governance

In theory, Pemex *as a company* is in charge of the entire Mexican hydrocarbon sector. Its formal legal structure is defined by two laws that together grant it exclusive rights to all aspects of the petroleum sector, as well as most aspects of the natural gas and petrochemical industries. In practice, however, the Mexican *government* – through actions controlled by several ministries – sets the tone for

5 Mexico, like the United States, is a presidential republic with a bicameral legislature. A popularly-elected president is both head of state and the head of a government made up of his appointed secretaries that run the nation's various ministries. All government spending requires the approval of the legislature, known as the Congress of the Union, which is divided into two chambers, the Chamber of Senators and the Chamber of Deputies.

the sector's management, from the Energy ministry's formal duty to set energy policy to other ministries' regulations that directly influence key Pemex actions. Pemex's corporate officers do not control long-term policies nor are they free to develop plans for the petroleum sector as they see fit or as the laws would suggest. Instead, the decisions on what Pemex will do and how the sector will develop are essentially made year-to-year during the government's annual budget approval process. Debates over petroleum policy are fought out on political grounds between the economists that currently control much of the Mexican government (notably Hacienda). Meanwhile, career Pemex professionals that may actually understand the petroleum business and the sector's needs are often left out of the decision-making process.

The disconnect between the theory and practice of Mexican hydrocarbon management is largely attributable to the corporate structure of Pemex, the details of which are set out in section 2.1 below. Pemex does not, in any sense of the word, operate "autonomously" from the Mexican government. In fact, management feels very much at the mercy of Congress and several ministries (PESD Interviews 2006-2007). Prospects for adequate funding are always uncertain – not least because of the complicated budget approval processes, ever-changing tax schemes, and questionable governmental assumptions about future oil prices. And because operation and policy are integrated in the nexus of Pemex and its administrative masters, the entire oil sector policy – as well as the operations of the sole company – are prone to being steered off-course by shifting political winds.

The government's failure to understand the petroleum industry (and Pemex as a company) breeds distrust and efforts to constrain the autonomy of Pemex. That, in turn, helps explain why Pemex fails to perform and also why the government lacks a sustainable long-term petroleum policy. If the government had the capability to evaluate hydrocarbon investment strategies and policies itself then, in theory, the result might be a more coherent policy for the sector as well as greater autonomy for Pemex. Analysts often point to Pemex's constitutional monopoly (discussed below) as the major impediment to restructuring the sector; while that is an obstacle, the government's lack of useful information about oil management remains as a more central barrier to better performance. The term of Felipe Calderón – a former energy minister himself with plans to reform the sector– may allow for the testing of this hypothesis.

The lack of a strong sectoral policy is a major reason for Pemex's operating inefficiencies and relatively weak financial position. Worse still than the weak financial and operating health of the company is the lack of discussion (or at least public debate) over the alarming hydrocarbon reserves situation in Mexico (see section 4 below). Many assume that deep-water reserves are plentiful and that

developing them in the near future will be an essentially trivial task. In fact, developing these reserves will require a transformation in how the company develops strategy and allocates risk capital. This lack of attention paid to a reserve situation that may soon lead to a very rude awakening is directly attributable to the weak overall sector governance, where the focus is always on governmental funding and the planning horizon is rarely more than a year long.

1.2 Corporate Governance & Political Influence

Pemex is 100% owned by the federal government of Mexico. There are no arrangements for ownership by non-governmental actors, although the topic does surface in public discourse, if only to be shouted down yet again by strong political opposition that often takes on nationalistic overtones. Several failed proposals have called for large Mexican institutional investors such as pensions, and possibly even private Mexican citizens, to be allowed part ownership (Smith 2004; Malkin 2004). But the idea of even partially privatizing Pemex – and in particular anything related with the exploration and production of oil – remains tremendously unpopular with the Mexican public (Smith 2004; PESD Interviews 2006-2007). Thus, the company continues on as before. In theory, it is supposed to be owned by the "Mexican People," managed day to day by a Presidentially-appointed CEO, overseen by a board of directors, and regulated by various government ministries. Meanwhile, Congress, with its fiscal powers, is supposed to have the highest level of oversight. Pemex management is quick to point out, however, that what this really means is that the government plays the roles of owner, manager, and regulator – with predictably inefficient results that have put the company in a straitjacket (PESD Interviews 2006-2007).

1.2.1 The President

Pemex is set up to be controlled by Mexico's President. Formally, the company is governed by an eleven member board that has control over all senior appointments except for the CEO, who is directly appointed by the President. However, six of these directors are "representatives of the State designated by the President," which have traditionally all been government ministers.[6] The President can appoint these board members at his will and does not even need Congressional approval. The remaining five directors are representatives of the Petroleum Workers Union. Mexico's President,

6 Occasionally, the head of Mexico's state-owned electricity company has also served on Pemex's board and vice versa. However, the board seats appointed by the President almost always go to government ministers, with the exact ministries that get a seat varying between administrations.

therefore, appoints both a majority of the board as well as the CEO.

Traditionally, Mexico's presidents were quite interested in Pemex's operations and they appointed close friends to head he company. In effect, several past presidents, including Lázaro Cárdenas, the man who nationalized the oil industry, exercised direct personal control over Pemex. The last two presidents, however, seem to have been more distanced from the firm. Claims have been made that neither Ernesto Zedillo (1994-2000) nor Vicente Fox (2000-2006) – nor most of their energy ministers, for that matter – understood Pemex and so just washed their hands of it, leaving the appointed CEOs to "deal with it" (PESD Interviews 2006-2007).

This lack of direct personal involvement in the company by the executive seems to have come at a bad time for Pemex, as the decade from 1995 to 2005 was transformative for the firm and the nation. This was the period when, after more than a decade of neglect and minimal investment following the oil crisis of 1982, Pemex was reorganized (see section 2.1 below) and critical investments began to be made (see section 3.2 below). This was also the time when the PRI's seven decades of one-party rule in Mexico came to an end and reform seemed to be in the air. However, the general criticism of President Fox as an underachieving reformer who had great potential and good intentions but lacked the will to finish the job, seems to extend to Pemex as well. During a campaign stop in the United States in 2000, Fox hinted that he might try to privatize Pemex (Smith 2001). However, once the predictable public backlash to this statement emerged, Fox backtracked and declared in his inaugural address that Pemex would continue as the exclusive property of the nation. Some analysts think that this promise not to privatize Pemex was unnecessary and amounted to a waste of political capital that made any other reforms for the next six years much more difficult to pass (PESD Interviews 2006-2007). But despite the relative distancing from Pemex by the last two presidents, the relationship between Pemex and the Mexican President continues to be an important one, as to this day, the President and Pemex's CEO have regular bilateral meetings to discuss the company's operations.

1.2.2 The Congress

At the same time that the direct Presidential influence over Pemex was waning, the Mexican Congress became interested in exerting greater political influence over the company. Prior to 1997, Mexico's PRI-dominated Congress did little more than rubber stamp most budgetary and other proposals regarding Pemex that came before it from the President or the government ministries (PESD Interviews 2006-2007). However, the legislative elections of 1997 marked a milestone in modern

Mexican history, as the PRI finally lost its simple majority in the lower house of Congress (the Chamber of Deputies). The PRI remained the largest of the parties in Congress, but persistent clashes with the opposition ensured that Congress would no longer be a passive branch of government. And with the electoral revolution of 2000 when the PRI lost the Presidency and suffered further losses in both chambers of the legislature, Congress really came into its own.

With regards to Pemex, the post-97 PRI-dominated Congress was a powerful opponent to any proposed reforms. During the Fox administration, there were at least a dozen reform initiatives that would have affected Pemex, but they didn't even get out of chamber to the floors of Congress (Smith 2001; Smith 2004; PESD Interviews 2006-2007). At the same time, Congress began to make use of its fiscal powers. While most Mexican congressmen do not seem to understand the petroleum industry, they do appreciate the fact that it accounts for at least one third of the federal budget in a typical year. Thus, the post-97 Congress was willing to exercise tight budgetary controls that forced Pemex to beg for every peso it got.

When approving the budget, the Mexican Congress only gets briefed on the overall Pemex picture and does not scrutinize individual projects or capex allocation. The macro perspective, along with lack of much knowledge about the sector, means that Congress tends to focus on the wrong indicators of performance. And it is prone to fury when Pemex does not deliver quick or expected results. A recent example is Congressional disapproval of the drop in production levels of crude oil despite tens of billions of dollars of investment in production over just the past five years. This production decline was entirely foreseeable given Pemex's reserve situation (see section 4 below), but Congress was oblivious of the coming crisis. This makes it harder for Congress to approve critical future investments if it feels it did not get its money's worth on previous ones (PESD Interviews 2006-2007).

While PRI and its allies in Congress could agree on what they did not want (privatization), they had no vision for the types of reforms that they would tolerate. This was probably due to the combination of PRI's nascent role as Mexico's opposition party (which meant it was better at causing trouble than leading change) and the one-term limit for legislators (as individuals cannot stay in the same position in government for more than six years[7]). In addition, unlike in the United States, there is no professional congressional staffing in Mexico. Instead, each member of Congress has a relatively

7 The term of Congress' deputies is only three years and that of senators is six. An individual can serve first as a deputy and then as a senator (or vice-versa), and can then repeat the process one more time. Thus, one person can stay in Congress for up to eighteen years, but would have four different positions.

small official staff that experiences high turnover. This leads to a loss of expertise on many matters, which is especially costly to the policy making process for complicated issues like petroleum governance. Because of this lack of knowledge and resources by Congress, larded with distrust of the executive branch, its members have simply opposed any reforms for Pemex.

The Congress that took power in September 2006 is in a better position to exercise positive power and influence over Pemex than its predecessors. The PAN party now dominates both chambers of Congress (although it still lacks outright majorities in either), and the new Mexican multi-party political system has had a decade to mature and develop in a way that opposition parties are more likely to play constructive roles. Moreover, PAN has become more sophisticated in crafting coalitions with like-minded factions within PRI. With a knowledgeable PAN president also in power, it is imaginable that meaningful reforms could be passed.

1.2.3 The Bureaucracy

Even though today's Pemex is vulnerable to significant political influence from both the President and Congress, the most direct political influence over Pemex in recent history has actually come from the various government ministries of Mexico's vast bureaucracy. Most ministers have responsibilities far more important than their Pemex regulation and/or board membership. In other words, the ministries that exert the greatest influence over Pemex have a myriad of goals to pursue and, as a result, Pemex's best interests are sometimes compromised.

These contradictions are especially glaring on Pemex's board of directors. Some of the same government ministers that sit on Pemex's board[8] also head the various ministries that are supposed to regulate the company. The Ministry of Energy monitors all of Pemex's activities and proposals, while the minister is chairman of the board. Hacienda (the finance ministry) is in charge of incorporating Pemex's budget and financing program into the government's annual consolidated budget and also sits on the Pemex board. Not every function is laden with conflict of interest. The Ministry of Public Function (known as "SFP"), which appoints Pemex's external auditors, does not sit on the board (but nevertheless impedes Pemex's performance – see below). Finally, environmental regulation is delegated to no less than five different ministries: Environment and Natural Resources (known as "SEMARNAT"), Health, Communications and Transportation, Navy, and Energy – some of whom are

8 The six current "State Representatives" are the secretaries of Energy, Hacienda (Finance and Public Credit), Semarnat (Environment and Natural Resources), Communications and Transportation, and Economy, as well as the "General Coordinator of Cabonets and Special Projects of the Presidential Office". (See Pemex website, at http://www.pemex.com/index.cfm?action=content&sectionID=11&catID=11746#11)

on the board and vested with approving the same projects and environmental consequences that, in their ministerial job, they must regulate (Pemex 2008).

This governance structure leads to conflicts of interest for ministers that are supposed to act as both regulator and, when sitting as a board member, for the company's interests. Usually, the role of Pemex board member is of secondary importance to the government ministers, meaning that the Pemex board in practice is not really an effective institution for corporate governance. Instead, key decisions were traditionally made through the offices of Pemex's CEOs who were, in practice, most responsive to the President of the country and not the board (PESD Interviews 2006-2007). During the de la Madrid administration (in office 1982-1988) the Pemex board functioned more as a real board, as President de la Madrid, a former Pemex CFO himself, made it a point of having the Energy minister present whenever he would meet with the CEO (PESD Interviews 2006-2007). The practice that emerged personally from de la Madrid was never enshrined more generally. Today, the Pemex board follows tradition and is largely a rubber-stamping body. Capex is determined by senior management and the Hacienda ministry, while staffing is largely the result of management's direct bargaining with the workers' union (which sits on the Board as well) and approval of the SFP ministry. The board as such is therefore left with little more to do than approve decisions that have already been made through other channels.[9]

On the environmental side, Pemex is governed by a broad federal law[10] as well as other environmental laws and regulations of the Mexican states. However, Pemex participates directly and officially with the Mexican Government in developing environmental regulations that relate to its activities. As a result, most environmental laws that should affect Pemex include escape clauses that allow the company to avoid meeting its environmental obligations for a number of reasons, including such simple ones as not securing enough funding for projects intended to meet an environmental law's demands (PESD Interviews 2006-2007).

Only in late 2005 did the government pass the first environmental law – on the sulfur content of fuels – that went into effect without Pemex's consent and a related escape clause. The high sulfur content of Mexican oil is a leading air pollution problem in all of Mexico, and the new law mandated that Pemex produce ultra low sulfur fuels by the year 2009. This presented a big engineering challenge

9 Pemex's subsidiary companies (see section 2.1) have their own separate boards that appear to be more functional than Pemex's corporate board. Those boards do not have union representation, but are nevertheless split fifty-fifty between Pemex insiders and government officials. These boards sometimes face real business decisions and have the discretion to make them. Nevertheless, it appears that whenever difficult issues arise, the government's interests always win out over the company's ones (PESD Interviews 2006-2007).

10 the "Ley General del Equilibrio Ecológico y la Protección al Ambiente"

to Pemex, whose refineries were not at all equipped to produce such fuels, and has led to about $5 billion worth of refining upgrades over the past several years (hence the recent uptick in spending on refineries even though these yield large losses for the company). Pemex did not think it could meet the law's demands in time and led a political fight that it ultimately lost. But it is still unclear whether Pemex will actually meet its legal obligations and, more importantly, what will happen if it does not. The most likely outcome is that Congress, when pressed against the wall, will once again grant Pemex a "pass" if it fails to live up to its environmental obligations. This seems especially likely given that Pemex has, in fact, had a difficult time securing the funding to come into compliance with the new law. The company at first tried to package its refinery upgrades as "PIDIREGAS" projects – which would have reduced the need for congressional approval – but was ultimately unsuccessful. Pemex has also made moves towards trying to cover the costs of the low sulfur fuels by passing them on to the users of those fuels through the raising of diesel prices, but that effort has been stymied so far by the inability to overcome a very powerful truckers lobby that opposes higher fuel costs (PESD Interviews 2006-2007).

Air pollution from high sulfur fuels is not the only major environmental issue Pemex faces. Two of its refineries (Salamanca and Tula) are major pollutants of the surrounding areas (which are also home to a number of highly polluting power plants) (PESD Interviews 2006-2007). Moreover, the heavy investment in and focus on crude oil exploration and production over the past decade brings up a whole host of environmental concerns. Major concerns associated with onshore oil and gas production include drilling waste fluids and solids, produced water and volatile organics, which can seriously contaminate surrounding water bodies. Pemex's oil pipelines are also famous leakers, with about a third of the network more than 30 years old and some pumping equipment is so antiquated that the company cannot find spare parts (McKinley and Malkin 2005; PESD Interviews 2006-2007). Following decades of neglect, Pemex has not yet secured needed funding for upgrades.[11]

When violations of the Mexican environmental laws and regulations do occur, they are hard to enforce. SEMARNAT seems to suffer from perpetual lack of funding, and it is hard to imagine SEMARNAT's minister cracking down on the enterprise that yields a large source of the federal revenue (and on the board of which the minister usually sits). Moreover, environmental laws have historically set low penalties, as between 2001 and 2005 Pemex paid less than $5 million in penalties, with only one prosecution of an official in onnection with negligence, despite numerous accidents and environmental violations over the same period (McKinley and Malkin 2005). It does not help that

[11] For example, in 2005, top management complained that the authorized budget for maintenance alone was almost $1 billion less than needed (McKinley and Malkin 2005).

Pemex's CEOs have traditionally been better connected politically than the SEMARNAT ministers (PESD Interviews 2006-2007).

Meanwhile, the federal prosecutor's office for environmental protection (known as PROFEPA) has the legal authority to get an injunction and shut down any Pemex operation that is in violation of environmental laws. But PROFEPA employs just 150 industrial inspectors nationally, and Pemex has 2000 installations to be checked. And although it has from time to time imposed fines on Pemex, PROFEPA has done so rarely, mostly with respect to minor Pemex projects that only symbolically show its strength (PESD Interviews 2006-2007).[12] Even PROFEPA's chief, at the very time that he held a news conference in 2005 to demand that Pemex repair 35 problematic pipelines, acknowledged in 2005 that any decision to shut down a major pipeline or halt a refinery would probably have to be made by the president of the nation (McKinley and Malkin 2005).

Although Congress, SEMARNAT, and PROFEPA have been largely unsuccessful in imposing good environmental behavior on Pemex from above, the company has nevertheless tried to behave responsibly – especially in recent years. There seems to have been a generational shift in Pemex's management, with the recent younger managers demanding good environmental practices and seeing environmentalism perhaps as a business opportunity. Moreover, environmental issues are seen inside the company as an increasingly reliable way to get more money for the company from the government at a time when the company is essentially cash starved for projects other than crude oil production infrastructure – such as with the refinery upgrades needed to cut sulfur (PESD Interviews 2006-2007).

Another conflict of interest arising from Pemex's governance structure is found in the company's important relationship with Hacienda. A former Pemex executive says that the company sends the finance ministry annual "Christmas letters" that amount to a wish list of what the company wants to do in terms of financing in the coming year. His impression from the responses Pemex received was that Hacienda is quite concerned about procurement processes and budgeting – issues that are expected to be important to a government regulator – but not nearly as attentive (or informed) about Pemex's technology investments, efficiency, and expansion (PESD Interviews 2006-2007). Yet it is this latter category of issues that is essential to an oil company's long-term health.

The reason Pemex must go to Hacienda each year in the first place is because the ministry, in effect, controls all the levers that affect Pemex's finances. It sets the prices Pemex charges

[12] A PROFEPA official, commenting on a deadly accident, was quoted as saying that "'The law does not allow us to take preventive action. I cannot close this pipeline because tomorrow there might be a spill. I have to wait until there is a spill." (McKinley and Malkin 2005)

domestically, it proposes the taxes Pemex will pay, and it decides on Pemex's budget that the Congress then to a large extent approves intact. However, despite this important role that Hacienda plays, it does not actually provide any strategic oversight for the company (PESD Interviews 2006-2007). That is, once Pemex submits its annual list of investment needs, they are evaluated by Hacienda's investment division, which analyzes only the proposed projects' expected cash flows and financial feasibility. Hacienda looks mainly at projects individually for their profitability, rather than in totality for their strategy. Hacienda relies entirely on Pemex for geological and technical expertise. After the financial analysis of the investment division, Hacienda's "debt division" looks at the costs of the proposals and the way they fit into Pemex's and the national debt profile. This division then has final say over whether to authorize each project (PESD Interviews 2006-2007). Lost in this division of responsibilities is the fact that no entity – neither Hacienda nor Pemex – develops a risk-based portfolio for long-term investment.

All in all, Hacienda – traditionally considered one of the most competent branches in the Mexican government – provides strict financial oversight of the company. But it does not – and cannot – provide strategic and technical oversight. Hacienda cannot know whether Pemex is wisely spending the budgets that are allocated to it, as only Pemex internally has the data necessary to thoroughly evaluate its investments. Hacienda also does not employ enough people with energy expertise that can keep abreast of Pemex's activities. It is Pemex that sets the overall production platform (i.e. how much the company will produce) and does the actual project analysis (PESD Interviews 2006-2007). Ultimately, what matters to Hacienda is whether Pemex will conform to its annual budget, not whether it is using the best technology or has a coherent plan for long-term growth. In other countries this larger portfolio analysis rests with the hydrocarbon regulator, but in Mexico this function has not been developed with any competent authority.[13]

Perhaps an even more difficult relationship than the one with Hacienda is Pemex's interaction with the Ministry of Public Functions (known by the acronym "SFP"). While this ministry does not currently have a seat on Pemex's board, its regulations influence Pemex's day to day operations more directly than any other single entity in the Mexican government. This ministry was created by President Miguel de la Madrid (in office 1982-1988) under a different name as part of a campaign against corruption. Its mission is to ensure external auditing for all public entities, including Pemex. However, over the years, it has grown tremendously in size and influence, and the myriad of inflexible

13 It was not until the spring of 2007 that the Energy Ministry even began to speak of "attempting" to fulfill such a role (PESD Interviews 2006-2007).

regulations it now imposes on public entities have become a bureaucratic monster. In fact, others segments of the government routinely refer to the SFP as "the Inquisitors."

There is a two-pronged division of SFP's oversight of Pemex. First, there are internal controllers for each entity monitored by SFP. This means that there are internal controllers of Pemex's central corporate operations, as well as controllers for each of the operating subsidiaries. These controllers are actually salaried employees of the entity that they oversee, but they report directly to SFP. Second, SFP itself employs "commissioners" that are charged with overseeing entire sectors of Mexico's public administration. Traditionally there has been one commissioner that oversees all of Pemex, along with the state-owned electricity companies. In practice, it is the internal controllers that scrutinize the actual operations of Pemex. The broader commissioners are much more politically driven and responsive to the political climate (PESD Interviews 2006-2007).

As part of its oversight, the SFP not only appoints Pemex's external auditors, but also determines its organizational charts, salaries, and even its employment positions. Thus, if a Pemex executive wants to create a new managerial position for an important Pemex project, he first needs to obtain formal regulatory approval from SFP. Even the creation of low-level union jobs require the agency's permission. Furthermore, SFP regulations control all of Pemex's contracting; yet SFP knows little about the oil industry – rather, it treats Pemex just like any other governmental bureau, not as an energy company. In the end, the same rules apply to a five million peso contract as would for a five hundred peso one (PESD Interviews 2006-2007). While the stringent oversight SFP exercises may, in some ways, be fitting for a country with a vast bureaucracy and significant potential for political corruption, it also clearly clips Pemex's autonomy and restricts the flexibility and risk-taking that are essential to running a business.

Recent oversight by the SFP has proved even more restrictive. During his administration from 1994 to 2000, President Zedillo was concerned that the SFP was failing in its mission to fight corruption and a proposal was made to establish a new, superior corruption-fighting body. A task force was assembled to study the proposal, which ultimately resulted in proposed changes to 27 administrative and financial laws. While these reforms did not go through, they did scare those at SFP into tightening up their own regulations and oversight (PESD Interviews 2006-2007). A tighter SFP leash, in turn, nearly immobilized the entire Mexican public sector. No one in government these days wants to take on the personal risks of signing any contract, as SFP can assault them even for the slightest inconsistencies and mistakes. Thus wary, Pemex's management has been especially reluctant to engage in creative problem solving or contracting. Even if there is nothing corrupt about their

activities, they are not willing to go out on a limb for their proposals when they know that in the last three years alone, SFP has initiated over 30,000 cases against public servants (PESD Interviews 2006-2007).

At the same time, there is very real concern in Mexico that SFP is still failing in its mission to combat public corruption. In other words, even though SFP treats everyone as potential crooks they are not successful in catching the actual crooks, who are innovative and tend to escape SFP scrutiny. In fact, SFP ultimately winds up losing about 95% of the cases it brings against public servants – although not until several years of delay and indecision have lapsed—with high cost and career damage—which is why the public sector is so afraid of SFP despite the enforcer's poor record in court. One reason why SFP is failing in its mission is that there are simply too many laws in Mexico, but not enough actual legal control. The laws and regulations that SFP enforces tell public servants *how* to do things, but the laws are substantively ambiguous. Without guidance on *what* to do, critical choices are left to political discretion that raises the risk of procedural review. The result is intensive process-based scrutiny but little impact on corruption (PESD Interviews 2006-2007).

More recently, there has been growing concern about corruption within SFP itself thanks to the ambiguities of the newer laws. The consensus these days seems to be much the same as it was when President Zedillo proposed the overhaul of SFP, namely, that the costs of the ministry far exceed its benefits.

Meanwhile, the one ministry with which Pemex should interact most closely, Energy, is wracked by too may problems of its own to effectively guide Pemex. In particular, the Energy Ministry has experienced tremendous turnover in recent history. In six years, the Vicente Fox administration had no fewer than four Energy Ministers. Moreover, it is not just the ministers themselves that rotate through the ministry – every time a change occurs, all the key decision makers get replaced with a new team. For example, when current Mexican President Calderón was appointed Energy Minister under Fox, he brought in his own people with a new agenda. Unfortunately, his term at Energy only lasted eight months before the cycle was once again repeated. With such high turnover and uncertainty, it is no surprise that Pemex officials feel that what the officials at Energy really care about is their own personal interests.

Outside analysts say that the Energy Ministry does not understand Pemex or CFE (the state-owned electricity company) (PESD Interviews 2006-2007). These companies are "black boxes" whose operations are not understood because the ministry lacks the technical expertise and durability of leadership needed to pry open their operations and scrutinize the complex technical information they

provide. As a result, the Energy Ministry cannot assert control and is ineffective at setting policy for the country's energy sector. In addition, the ministry itself has structural reasons to oppose one of the most important reforms of Pemex – a shift in corporate governance to an independent Board – because the Energy Minister's Chairman seat on the Pemex board is a flagship (if largely ineffective) function.

1.2.4 Political Corruption & Prospects for Reform

Despite the oversight from the SPF and the fact that no one single organ of government has exclusive control over Pemex, political corruption has not been rooted out of the company. A recent example is the "Pemexgate" scandal of 2001, when it was discovered that funds from the Pemex workers' union were used to support the year 2000 presidential campaign of Francisco Labastida, the candidate for the incumbent PRI political party that at the time controlled both the legislative and executive branches of government (and, therefore, Pemex). Ultimately, those claimed responsible were not convicted, although the political party was fined about $90 million. A leading theory for why the scandal was not prosecuted rigorously is that Vicente Fox, the winner of that election, was shadowed by his own corruption, money laundering, and illegal donation scandal (known as "Amigos de Fox"). Thus, the two main political parties seem to have essentially agreed not to pursue the corruption cases against each other. Left out of this settlement, however, were any provisions to prevent Pemex from getting caught up in a similar situation in the future.

There is also little political will to decrease the political meddling with Pemex. In early 2001, President Fox broke with tradition and appointed four private Mexican business executives to the Pemex board, including Carlos Slim – Latin America's richest man. Fox argued that the President was not legally required to use his board appointments on his own government's ministers. However, legislators strongly disagreed and quickly forced the four businessmen off the board, and Fox subsequently replaced them with government ministers just three months later (Arai 2005). The episode was a particularly bitter experience for Mr. Slim, who continues to campaign for independent board members, freedom from the government budget, and professional management without political interference. So far, his cries have not been answered.[14]

Several Pemex executives admit that politics continue to affect the entire company. They describe changes in government, when they occur, as "a major issue" in the appointment of Pemex managers (PESD Interviews 2006-2007). Therefore, it seems clear that reducing the political influence

[14] It should be noted, however, that even Mr. Slim maintains that Pemex needs to remain in government hands "because of its importance to the economy," highlighting just how taboo the topic of privatization remains in Mexico (Arai 2005)

and conflicts of interest that surround Pemex, not to mention the myriad of regulations, could go a long way towards refocusing the company on its own needs. The fact that Mexico is no longer a one-party state and that Congress and the Presidency are currently controlled by different parties is probably good for Pemex, but not nearly enough to save it from undesirable political meddling. Ironically, Pemex, with all its current problems, could probably use strong and clear guidance from the government today. But the bitter multi-party political climate in Mexico, combined with the many restrictions imposed by the bureaucracy, makes it nearly impossible for anyone in government to effectively steward its energy company. As explained below, corruption is not the biggest problem to come out of Pemex's relationship with the government – rather, it is the formal structure of the relationship itself that costs the company the most.

1.2.5 The Problematic Results of Government Interactions

The overall conclusion is that Pemex's interaction with the various levels of the Mexican government is a major source of inefficiencies. Given the Mexican political climate, no one actor in the government can actually control all of Pemex. At the same time, multiple actors actively exert significant pressures on the company through regulations, budgetary controls, political appointments, and other means. This situation creates two types of damage. The first is that Pemex management – the very people that are actually supposed to run the company – is effectively stripped of responsibility through political interference from multiple directions. And second, no other actor is able to effectively substitute for the abdication of responsibility by Pemex's management.

These problematic results are best illustrated by looking at Pemex's capex approval process. Pemex's investment proposals first go to the Energy Ministry, which then passes them on to the Hacienda investment division. Energy tries to convince Hacienda to include the project proposals in the annual budget, which Congress then has to approve. Following Congressional approval of the overall budget, individual projects go back to Hacienda for final approval. Once this is all done, the SFP steps in to make sure that everyone was behaving well during the capex approval process and to oversee the mandatory public bidding process for procurement of goods and services (PESD Interviews 2006-2007).

This system provides multiple (and sometimes conflicting) levels of capex approval oversight from several different directions. And yet, none of it is strategic in nature. As already mentioned, Congress and the Energy Ministry are far too political and unstable to provide for meaningful oversight. Meanwhile, Hacienda is primarily concerned with macroeconomics (notably debt exposure)

(Emmond 2005; PESD Interviews 2006-2007). And SFP's close scrutiny of capex allocation is strictly attentive to process. Left out of the picture is any technical or strategic evaluation of Pemex's investment proposals by the government, as that is done almost entirely in house by the company – a company that, over several decades, has lost touch with the engineering and risk management frontier of the industry.

Worst of all, even though the governmental oversight is not strategy-oriented, it actually does have a huge impact on the business strategies and procurement options that are available to Pemex's managers. Mexico's government is heavily dependent – some say addicted – on oil revenues (see section 3.1.5 below) and so Hacienda's financial regulations are of paramount importance to the company. In fact, a Mexican government official says that Hacienda has been the key driver of Mexico's petroleum history, as Pemex is forced to follow strategies that will meet Hacienda's financial requirements (PESD Interviews 2006-2007). Meanwhile, the prospect of personal scrutiny by the SFP is so onerous that managers become very risk-averse and stay strictly within the bounds of behavior set by SFP, even though such actions may not be best for the company from a long-term strategic perspective. (Exploration and production—the areas where smart investment is most needed—are most productive when they involve wise risk-taking over a balanced portfolio of activities.)

Thus, while neither Hacienda nor SFP consider Pemex strategy when formulating their regulations, they do ultimately heavily influence the strategies that Pemex pursues. Meanwhile, the Pemex managers that actually conduct project analysis and decide on investment proposals feel that their hands are tied by these regulations. More importantly, these managers are not accountable if their strategies or investments fail because they can always blame the government for the company's shortcomings (e.g. for not approving enough funds, or not allowing enough equipment procurement flexibility, or for not being able to enter into particular kinds of contracts).

Pemex insiders and outside observers frequently point out that no one within Pemex will ever advocate the use of more expensive and risky, but potentially much better, petroleum technologies than those currently deployed so long as the company is tethered to conservative procurement rules rather than actually procuring the best technology available (PESD Interviews 2006-2007). There is simply too much personal risk involved for any Pemex manager pushing for change that would increase managerial discretion, particularly since Pemex managers are not held accountable for performance in the first place. Worse still, even if SFP and Hacienda wanted to move to more advanced approaches, it would be too hard to explain the long-term benefits to an uninformed Congress that is prone to focus on immediate and sure yield from Pemex rather than hypothetical benefits from a new approach to risk

investment. The procurement and contracting laws explicitly says that Pemex must always go with the lowest cost option that is arrived at through a scrutinized bidding process. It is difficult to change these laws, even if it means that Pemex always winds up with worst, but reliably cheapest, technologies.

The impression both within Pemex and in other levels of government is that it is just easier to follow the rules regardless of the negative impact they have on the firm's long-term performance (PESD Interviews 2006-2007). According to one Pemex executive, managers are frustrated by regulations such as the one that prevents them from entering into negotiations for any contract until a public tender has been declared at least twice. He feels, for example, that he could get a much better deal for many of the field services that Pemex contracts out to other companies (see section 2.5) if he could just enter into private negotiations with those companies. Instead, he says that he and others in Pemex actively try to minimize what they do and even avoid signing contracts that fall well within SFP's regulations because "every time you sign anything, you are exposed to detailed scrutiny of even minor things." Another executive focused less on SFP and more on Hacienda, claiming that getting Hacienda to refocus away from Pemex as the keystone to the state budget would make it easier to change several important fiscal laws and possibly even the Constitution in order to improve Pemex.[15]

This combination of heavy political interference without actual governmental control is a key distinguishing factor between Pemex and other NOCs (although elements of sclerotic procedural regulation are also evident in the case of Kuwait Petroleum Corporation). While the managements of some other NOCs are also vulnerable to being stripped of responsibility by governmental actors, those NOCs are not likely to be left with an accountability and leadership void of the type Pemex experiences. Notably, the Mexican Executive – in particular the President – is unlike his counterparts in many other countries in that it is very difficult to control the company as his own personal tool. In the past, Pemex was, in fact, controlled by the President and was, for a time, a sort of "superagency" within the government. But the rise of the SFP ministry, multi-party democracy, and other checks on executive control brought this age to an end. Mexico followed the partial wisdom of corporate governance theory by containing the executive's exclusive political control but, in the process, it has not allowed any other competent and accountable authority to exert influence in the void.

The decentralization of political influence and rise of regulations also coincided with the shift in Pemex's strategy discussed earlier in this paper. At the time that Pemex was effectively controlled by the Mexican President – with daily operations left to Pemex's engineers – the company was concerned

15 Such a refocus, however, would be difficult because it would require a broader reform in Mexico's income tax system to cover the near-term loss in state revenues (see section 3.1 below).

with supplying fuels and developing the country because that provided tangible political benefits to Pemex workers and consumers, which accrued to PRI. As the company's financial importance grew following the resumption of large-scale exports in the 1970s, government interference expanded and the company's mission shifted. Like the rest of the Mexican government, Pemex came to be controlled not by engineers but by economists and they subsequently shifted the company's focus to activities that yielded prompt financial return. Starting with the nation's financial crises of the 1980s and continuing through the company's reforms in 1992 (see section 2.1 below), the central role of Pemex got distorted as the goal became to invest in projects that maximized returns and helped service national debt. Thus, Pemex had to devote itself to exports and when the export revenues came in, the government took them for the general budget use. Increasingly, Hacienda came to use Pemex's status as a blue chip oil producer to contract debt. But while the 1990s witnessed significant improvement in Mexico's financial stability and political governance (at least when compared with the previous decade), what was left out was Pemex's traditional mission of developing the country (PESD Interviews 2006-2007).

Even if the various branches of government are today content with having near-term revenue maximization as the central goal of Pemex, the relationships between Pemex and the government make it difficult to achieve even this goal. That is, if Pemex's strategy is to be focused on crude oil exports, the company could achieve much greater long-term returns if it were allowed to be more forward looking and risk-taking, with control over the capital budget allocations. Most notably, the company would have been wise a few years ago not to invest so heavily in production but instead would have redirected a significant portion of new infrastructure investments towards exploration (particularly in deep waters). However, the nature of the budget approval process, combined with high oil prices, left the company no choice but to produce and sell as much crude oil as possible in the short-term. Thus, as things stand today, Pemex is essentially forced to maximize proximate *annual* revenues for the current year and cannot work toward maximizing long-run earnings.

1.3 An Unhappy – and Vocal – Management Team

One of the most remarkable aspects of Pemex's inefficient governance is management's willingness to talk about it. It might be expected that a state-owned company with a long history of political influence would simply tow the government's official lines and pretend that nothing is wrong. This is not the case with Pemex. Top executives, it seems, are more than happy to talk about how terribly their company is organized and how badly it is underachieving. And they are always quick to place the blame on poor governance from above.

Annual reports and other Pemex publications over the past several years are filled with management's complaints about the lack of autonomy and excessive taxation of the firm. While still affirming that Pemex exists solely for the benefit of the Mexican nation and that it should not be privatized, Pemex's leadership has voiced concerns that the company is irresponsibly used as a cash cow for too many government programs that benefit neither Pemex nor the country. Interestingly, while management feels that they have too little control, they also say that they feel little accountability to the political forces that control them (PESD Interviews 2006-2007). As they see it, there is really no one that either they or other employees need to be accountable to for performance (other than, in theory, the Mexican people themselves). Managers openly say that because the government is Pemex's owner, manager, and regulator, there is almost no effective oversight of the company.[16] Management agrees that, as mentioned above, Pemex is getting the worst of both worlds – excessive control by outsiders and very little accountability for insiders.

Management views Congress, Hacienda, and SFP as the most problematic parts of government because they put management in a financial and governance stranglehold. Since 2004, company reports and conference calls with banks have often stated that management's main goals are to increase efficiency and implement "corporate governance best practices." To reach these goals, management lists a long series of necessary reforms, but their main demands boil down to asking for much greater tax relief, a separation of Pemex from the federal budget, greater contracting flexibility (including new procurement laws, an overhaul of the audit system, and an ability to enter into joint ventures), and an independent board (Pemex 2008; PESD Interviews 2006-2007).

A dissatisfied Pemex leadership is nothing new, however. Management has been making similar complaints (one journalist describes it as "running around and yelling that the sky is falling") for at least the last fifteen years (PESD Interviews 2006-2007). Therefore, while political meddling may force Pemex to bankroll government policies at the expense of its own efficient operations, Pemex itself is not just another political tool. The fact that Pemex management is free to loudly and openly voice its concerns lends support to the theory that politicians cannot exercise full political control over the firm. Top executives, for their part, have no qualms about pointing out the government's – and in particular Congress's – ignorance of their business. Ideologically, they have few reservations about doing so, since they are formally accountable to the Mexican people and so should be open when things are not going well.

16 "It's just the same guy wearing three different hats. How can he hold himself accountable?" asks one executive.

One former head of a Pemex subsidiary describes the company's top managers as "niños héroes."[17] Such lofty praise evokes images of young, honest, and idealistic professional managers that fight a heroic battle to run Pemex in the best interests of Mexico despite the tremendous political challenges they face at every turn. But there is likely more than youthful idealism behind management's constant complaints and calls for reforms. For one, the more recent complaints may actually show that top management is actually quite responsive to political influence from the executive branch of government. The PAN victories in the 2000 and 2006 elections empowered a political party that has sought to give Pemex much greater autonomy – especially from the restrictive taxes imposed by the PRI-controlled Congress. The hotly contested 2006 national elections, in particular, seemed to fuel the PAN-appointed management's ire against the PRI-controlled Congress.

In addition, managers might be voicing their complaints out of personal pride as much as political influence or any other motivations. Rather than risk reputational loss and admit to an inability to deal with (at least some) of Pemex's operational problems, management may find it particularly easy and convenient to blame Congress, the President, and the workers' union for all their troubles (PESD Interviews 2006-2007). A case in point is former Pemex CEO Raul Muñoz, who used to head DuPont's operations in Mexico. Despite high hopes when president Fox appointed him to lead Pemex, Muñoz was unable to achieve any of his stated goals in four years on the job and resigned in frustration (Smith 2004). Two years later, he wrote a book titled "Pemex in the Crossroads: a story of management" where he reproaches President Fox for not having supported Pemex more strongly and for not having installed the right people in his administration (where "different groups, each with its own agenda and electoral calculations," made his job difficult). Muñoz's frustrations seem based, more than anything, on the too many constraints (mostly coming from the government) that all Pemex CEOs must manage. The Pemex executives that come in from successful private businesses cannot work in the ways they're accustomed to once they enter Pemex. Unless they are aware of this fact and try to change the constraints the government imposes, which Muñoz did not do, they are bound to underachieve or even leave in frustration.

Whatever the reasons behind it, Pemex management's ability to at least "complain" to the government does seem to have yielded some recent results. Since 1998, and particularly during the Fox administration, the company has significantly increased investment in long-term infrastructure.

17 The phrase "Niños Héroes" (translated as the "Boy Heroes") refers to six Mexican teenage military cadets that died defending Mexico City's Chapultepec Castle from invading U.S. forces in 1847. Legend has it that despite their commanders' orders to retreat, the six cadets resisted the invaders until they were killed – with the last survivor leaping from Chapultepec Castle wrapped in the Mexican flag to prevent it from being taken by the enemy.

Although all capital expenditures and operating expenses must still be approved annually by Congress during the overall budgeting process, almost all new infrastructure projects that do get approved have guaranteed financing that is immune from across-the-board budget cuts in subsequent years. (Unfortunately, these infrastructure projects are all debt financed, which has ballooned Pemex's debt levels—creating a whole new set of problems explored later in this paper.) Thus, to some degree, Pemex is at least able to invest in long-term infrastructure after almost twenty years in a wilderness of under-investment. This investment window has given management some room to begin developing the firm's long-term strategy and possibly to face the looming reserves crisis. More recently, the last three years have seen Pemex obtain at least some concessions for more favorable tax treatment (see section 3.1.4 below), the benefits of which are overwhelmingly destined for investment in exploration and production. Thus, while debilitating governance problems remain, recent reforms suggest Pemex may slowly be moving to a position where it can better manage its own operations. The obstacles that arise through oversight of procurement, however, remain fully intact.

1.4 Transparency and Financial Accounting

If nothing else, the Fox administration did bring with it an emphasis on business-like transparency in government. Pemex aligned itself with this trend by subscribing to relatively high standards for transparency and financial accounting. Independent auditors – PricewaterhouseCoopers – sign off on the company's financial reports, which make no secret of the firm's troubled financial affairs. In addition, Pemex maintains a highly detailed "Investor Relations" section on its website – the only section of the site available in both Spanish and English – where it regularly publishes financial information, operating statistics, regulatory filings, and other publications. It even invites site visitors to join in on quarterly financial conference calls with Pemex's CFO.

This highly detailed and transparent reporting – presumably with accurate figures – on almost all of Pemex's operations seems curious at first, since a well-run investor relations program in English might not seem like a top priority for a 100% state-owned Mexican enterprise with huge inefficiencies. But given Pemex's debt levels and increasing reliance on debt markets, transparency is essential to sustaining good relations with the banks. And since the company raises some of its funds on U.S. markets, it must follow certain SEC rules for financial reporting in order to have access to credit agencies and credit ratings. In addition, Pemex management is placing greater emphasis on aptitude with financial statistics and reporting – as part of its broader efforts to improve corporate governance – and some observers think that rigorous financial transparency is part of a stealth effort to prepare the

firm for eventual privatization.

Still, executives admit that there is only so much they can do. They point out that there is no real internal auditing of Pemex and that the accounting on which PricewaterhouseCoopers actually signs off is for Pemex corporate only. The financing and accounting of Pemex's operating subsidiaries is separate and internal audits there are extremely difficult (PESD Interviews 2006-2007). Thus, like any visitor to Pemex's investor relations web site, executives at the company must accept the subsidiaries' word for the accuracy of many of the numbers they post. Similarly, it is often hard to see how all the posted figures fit together and some are appear inconsistent with each other.

2) Internal Structure and Operations

2.1 Corporate Structure

Pemex is a large and fully integrated oil company that also has operations in natural gas and petrochemicals (Pemex 2008). The core operations are performed by four fully-owned subsidiaries, each with their own management team. The oil operations of the firm consists of two of these subsidiaries: Pemex Exploración y Producción (Pemex E&P) which explores, produces, transports, stores, and markets crude oil and natural gas; and Pemex Refinación, which refines, stores, transports, distributes, and markets petroleum products. The other two subsidiaries are Pemex Gas y Petroquímica Básica (processes, stores, transports, distributes and markets natural gas, natural gas liquids, its derivatives, and basic petrochemicals) and Pemex Petroquímica (which engages in industrial petrochemical processes and stores, distributes, and markets petrochemicals other than basic petrochemicals).

In addition, another subsidiary – P.M.I. Comercio Internacional – serves as Pemex's international trading arm. PMI manages trading operations outside Mexico for the entire company. It primarily positions and sells Pemex E&P's crude exports but also provides trading, commercial, and administrative services to the other subsidiaries, including the transfer of funds from Pemex's foreign financing vehicles to Pemex corporate. PMI was established in 1989 and tasked with making Pemex more competitive internationally. Its operations account for virtually all of Pemex's foreign activities. PMI has somewhat more flexibility than the other Pemex subsidiaries and it can enter into some types of contracts that are off limits to the other subsidiaries because it operates off shore and does not actually own any of the oil it markets. In addition, a majority of PMI's workforce is not unionized, which stands in sharp contrast with Pemex's other subsidiaries.

This corporate structure was implemented in 1992 following the "break-up" of operations that previously had been centrally managed directly by Pemex corporate headquarters.[18] The decentralization was intended to lessen the difficulty and increase the efficiency of running such a large company and was part of the strategic shift in the early '90s to focus on boosting the economic return from investment. As part of the same reforms, Pemex eliminated its bloated and inefficient construction engineering arm.[19] At about the same time, Pemex for the first time established a transfer price mechanism to track and account for the movement and value of goods shifted between the company's different units (PESD Interviews 2006-2007).

While more efficient than before, the company still seems to have too much on its plate to be able to operate efficiently. With over 140,000 employees across its operations, it is difficult for anyone – especially the politically appointed top management that usually stays with the company for only a few years – to effectively operate such a massive integrated entity.

Pemex's overly broad operations also make it difficult to prioritize projects. Prior to 1992, the company was essentially operating blind, as the lack of transfer prices between different units in Pemex eliminated any notion of financial performance outside of end-customer sales (which are far removed from the point where most value is actually added in the oil industry). Pemex managers had no idea which units and projects performed best; nor did they have a system for accurately targeting investment needs. Even well into the mid-90s, Pemex operated without tracking a portfolio of projects – it was not until 2000 that the company finally started ranking projects by profitability. More recently, the company has begun to keep a track of project profitability at both before and after tax levels, signaling that seeing a return on investments is becoming more important at the company (PESD Interviews 2006-2007).

And despite the institutionalization of transfer prices and project portfolios, investment allocation at Pemex is still proving difficult. Under pressure to maximize revenues, current record crude oil prices have forced Pemex to sacrifice its other operations in favor of investment in crude production. The capex allocations of the past few years are consistent with those at other integrated companies – with E&P getting the lion's share of investments – but within E&P, it is *production* that dominates, as exploration has received relatively little attention even with the hydrocarbon reserves problems facing Mexico.

18 The term "Pemex" throughout this paper refers to the entire organization – Pemex Corporate and all its operating subsidiaries. Whenever specific subsidiaries are discussed, they are referred to by their appropriate names.

19 Many of the construction services previously performed by that unit are now contracted "out" to firms closely linked to Pemex and its union, with only questionable savings for the company.

Even natural gas operations, which could be hugely profitable and could easily go hand in hand with the oil side of the business, were traditionally neglected in Pemex's E&P activities (PESD Interviews 2006-2007). It is difficult for any oil company to become a gas company, but the entry into the gas business seems to have been particularly difficult for Pemex. An interest in gas operations first materialized in Pemex in the 1960s because of demands from Mexico's chemical industry. This proved to be a false start, however, as meaningful gas operations did not appear until more than thirty years later. It took a lot of external pressure from government and others to get Pemex into the gas business in the 1990s. Pemex resisted this push, even though many outsiders at the time could see that development of Mexico's gas reserves could be a boon for the company and the country. Despite Pemex's resistance, in 1995 the Mexican government passed a series of electricity and downstream gas reforms that favored gas for the generation of electricity (it is cleaner and cheaper than oil-fired power units that have historically dominated Mexico's power sector) and for some industrial applications. In fear of a flood of gas imports, Pemex opened up the Burgos Basin (which was known to have substantial gas reserves) for development in 1996. At the time, over eighty-five percent of Pemex's gas production was still associated gas.[20] Moreover, because of traditional neglect of the gas business Pemex had to subcontract the entire development and production in the Burgos Basin to other companies. Pemex's total company-wide gas production actually declined for the next several years and it was not until 2004 that it increased and the effects of the reforms in the mid-90s were evident. Even so, Pemex is still underinvesting in its potentially profitable gas operations, as investments in new hydrocarbon exploration tilt heavily towards discovering new crude oil rather than gas.

Pemex's refocus on crude oil production was also the reasoning behind plans that called for a break-up and privatization of Pemex Petroquímica as part of the 1992 reforms. Some units of this subsidiary were actually spun off in preparation for sale and privatization, but those plans were abandoned during the 1994 shift in administration (when Zedillo was elected President of Mexico) and those units brought back into Pemex's fold.[21] In the meantime, from 1990 to 2002, the petrochemical sector in Mexico decreased 55%, as there have not been significant investments that maintain it competitive with foreign products.

Many observers today are calling for Pemex once again to refocus its strategy and do much

20 The term "associated gas" is used in the industry to refer to gas that naturally occurs in combination with crude oil in reservoirs. Such gas (and any benefits from its capture and sale) is therefore mostly a byproduct of an oil firm's exploitation of crude oil reserves. By contrast, non-associated gas is one that occurs separately from crude oil and is targeted, as such, for development by a company.

21 Zedillo offered to sell as much as 49 percent of some Pemex petrochemical assets to private investors but that proposal failed to attract any bidders because companies didn't want a minority partnership with Pemex in control (Arai 2005).

more with its underdeveloped petrochemicals and refining subsidiaries. Prominent Mexican politician Cuauhtémoc Cárdenas (son of Lázaro Cárdenas, the man who nationalized Mexico's oil sector and created Pemex in 1938) has further argued that Pemex should radically reduce, and ideally eliminate, crude oil exports. Instead, Cárdenas would like to see Pemex invest heavily in its refining and petrochemical production capabilities in order to transform Mexico into an exporter of *refined* products such as fuels and other petrochemicals. "That would mean that we are really industrializing and developing the country," says Cárdenas (Cárdenas 2006; Cockrell 2006).

Although Cárdenas's calls for a sudden re-orientation and development of new core competencies at Pemex are mostly wishful thinking, they do highlight a key operational deficiency in the company – namely, the excessive focus on crude oil extraction and export, mostly to the United States. Meanwhile, Mexico is actually is a net importer of many refined products – most notably gasoline – and natural gas, almost all of which come from the United States. As Cárdenas points out, "we're importing gasoline and other fuels, and our oil balance is becoming negative. It hasn't become completely negative because [crude] oil prices are high. But if they were not high, we would be having, since a few years ago, a negative balance in our oil import-export, importing more than we're exporting, in value." (Cárdenas 2006; Cockrell 2006)

It may, at first, appear surprising that Mexico – a nation with an oil-based economy and massive hydrocarbon production – needs to import expensive gasoline, other refined products, and natural gas.[22] But this is the direct consequence of a corporate strategy built around crude production and decades of ad hoc internal investment allocation. There are significant reserves but not the necessary infrastructure to process them, particularly when it comes to the laggard petrochemical and refining subsidiaries. In addition, demand of gas by both the electricity and private sector has increased significantly over the last decade, further exacerbating the import dependence. Given this history and a still ongoing emphasis on crude oil exploration and production, it seems that the best way for the other operating subsidiaries to emerge from E&P's long shadow and improve efficiencies would be to allow them to be spun off from Pemex – or, at minimum, to have greater operational and financial independence from E&P.

2.2 Internal Relations

The interactions between Pemex management, employees, and the Petroleum Workers' Union

[22] After all, Mexico exports more than 50% of its crude production and is self -sufficient in terms of electricity.

are quite troubled. There is a sense that the politically appointed management at the top is completely disconnected from the career Pemex employees, including other managers. One former head of a Pemex subsidiary stated that he "had no idea" who worked four levels below him, even though those mid-level managers were "the ones who ran the show" (PESD Interviews 2006-2007). There is also a general impression amongst the Mexican public that there is lots of corruption and outright theft amongst the rank and file Pemex employees. However, this perception may primarily be based on consumers' negative experiences with Pemex gas stations, which are actually not owned or operated by Pemex despite carrying its brand (see section 2.4.1 below).

The internal problems begin at the very top—executives who come to Pemex as successful businessmen but fail to carry their successes over to Pemex. Even though top managers may be well-respected and well-meaning business leaders, it takes more than business savvy and good intentions to be effective at Pemex. Most executives simply do not have enough experience working within the state-owned enterprise structure to understand its complicated operations and interactions with the government (PESD Interviews 2006-2007). Heading a private firm or even being the country head for a large multinational requires a different skill set than that needed to run a state enterprise like Pemex. Raul Muñoz, the successful former DuPont executive who found nothing but frustrations in his four years at Pemex, found this out the hard way. Described by one journalist as a "kind older gentleman that just could not handle it," Muñoz resigned under fire in 2004.

But the single biggest factor that strains internal relations in Pemex is the workers' union—in particular, union leaders. Pemex executives, Mexican government officials, and independent journalists all say that the union has enormous power. Yet almost no one outside the union seems to understand exactly how it wields this power or whether the rank and file really support their leaders. What seems certain is that the union leaders are virtually untouchable. They are always quick to remind top executives that union members are there to stay, whereas top executives rotate through the company.[23] Thus, even when faced with a strong CEO who might want to stand up to the union, the union leaders enjoy the benefits of experience and time. As such, union leaders have secured de facto veto power over management proposals (PESD Interviews 2006-2007).

The union also has a lot of formal power within Pemex. The most obvious is that five of the company's eleven board seats are reserved for union representatives. In addition, Pemex managers do not control the hiring of new workers – the union does. The union also decides staffing – it decides

23 The common joke about Pemex is that only the union and consultants are constants, with everybody else rotating in and out.

who drills wells and which employees are assigned to particular projects. This "filling of spaces" is one way in which union leaders maintain control over the rank and file and allocate benefits to workers. In turn, Pemex workers support their union leaders because they provide secure, steady jobs that the workers don't want to lose. Being a union member pretty much guarantees an employee a stable, middle-class life that is the envy of most Mexicans. In addition, Pemex workers can count on a generous pension from the company when they retire. Currently, both salaries and pensions are tied one-way to oil prices, meaning that Pemex workers have largely benefited from the recent rise in oil prices and will not suffer if prices eventually drop. In fact, the latest union contract (signed in 2004) is seen as so lucrative and favorable to the union by journalists and consultants that it is often cited as the primary reason why former CEO Muñoz had to step down – he was rendered impotent to improve the company's performance after making too many concessions.[24] (Malkin 2004a)

Despite the current problems with the union, the real struggles between the government and the union leaders were fought out twenty years ago. The union saw the climax of its power – and corruption – during the presidency of Miguél de la Madríd in the mid 1980s. At the time, Pemex and its union had essentially become a state within a state. But when Carlos Salinas was elected President of Mexico in 1988, he immediately cracked down on the union. One of his first acts as President was to jail the union leaders for corruption. He then drastically reduced Pemex's bloated unionized workforce from around 220,000 to 120,000. As a result, Salinas' term witnessed almost daily strikes and the company's corporate offices were sometimes closed off by strikers for days on end. Nevertheless, management at the time succeeded in taking over significant management responsibilities from the union. During the subsequent Presidency of Ernesto Zedillo (1994-2000), the union regained some of its power and influence and even managed to add over 20,000 workers back into Pemex.[25]

Today, the union remains strong but has changed the way it interacts with Pemex management. It is a different relationship than the time of the union's prime of the 1980s. For example, the union no longer automatically resorts to threats of paralyzing strikes (there has only been one in the last six years) as a way to push its agenda, which alone distinguishes it from most other unions in Mexico. Instead, union leaders have found new ways to bargain with and profit from Pemex. Most notably, the union has not resisted Pemex's strategic shift to outsourcing and subcontracting many of its activities over the past decade. Instead, union leaders are involved with and profit heavily from many of these

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[24] In addition, Mr. Muñoz signed the contract without the backing of the Pemex board.

25 One analyst says that current employment at Pemex is well over 140,000 and possibly as high as 200,000 because the company does not count a category of "temporary" workers (known formally as "temporary workers who have been with us for over ten years") in its official employment statistics (PESD Interviews 2006-2007).

contractors. Many services companies such as those that provide transport for Pemex's workers or those that serve food on the oil platforms are actually owned by union leaders. In addition, many of the riskiest and most unsafe jobs at Pemex are now performed not by unionized Pemex workers, but by employees of the private companies that Pemex contracts with. The private companies' safety record is worse than Pemex's, but the union leaders tolerate these conditions because they directly profit from the subcontracting.[26] (PESD Interviews 2006-2007)

Ironically, worker safety continues to be a major problem at Pemex and one that union leaders continue to claim is a major issue for them. In the span of just eight months in late 2004 and early 2005, there were 12 pipeline accidents – some deadly – involving Pemex. These problems are nothing new, as the PROFEPA environmental protection agency (see section 1.2.3 above) was created in the first place in the aftermath of a major Pemex pipeline explosion in Guadalajara that killed over 200 people.[27] Pipeline explosions and gas accidents are quite common at Pemex, which is not surprising given its antiquated infrastructure, and the company is infamous in public eyes for its disregard for safety and the environment (McKinley and Malkin 2005). Management voices concerns over the issues, but little actually changes in practice because funds are not allocated for adequate maintenance. Meanwhile, the five union board members continue to use worker safety only as a pretext for gaining other concessions like salaries, housing, and sheer employment numbers, which seem to be a lot more important to them.

On the employment numbers side, the union has also tolerated a recent rise in the percentage of Pemex workers that are not unionized. However, even those statistical percentages are misleading, as the union has authorized management to hire non-unionized low-level workers only in exchange for benefits such as subcontracting to union-leader-owned companies and even the hiring of more unionized workers in other parts of the company (PESD Interviews 2006-2007). Thus, the union has not had any trouble sustaining employment numbers and workers' benefits – the cornerstones of its stronghold within the company.

Some observers lament the fact that the Fox administration easily succumbed to union pressure rather than forcing a showdown in the way that President Salinas did twenty years ago (PESD Interviews 2006-2007). They see the positive changes that were made during the Salinas administration

[26] An April 2005 accident that released an estimated 60 liquid tons of ammonia gas that killed six workers was blamed on a subcontractor cutting into the wrong pipe after a supervising engineer left to check on the location of the right one. The victims had been employed by the subcontractor for only a few months and had not been provided with protective suits. The total compensation given to all six families was only $74,500 (McKinley and Malkin 2005).

[27] Six years earlier, a liquefied petroleum gas terminal blew up outside Mexico City, killing more than 500.

as a job left unfinished and eroded by subsequent presidents. In not confronting the union leaders over their excessive influence and benefits, they also see a wasted opportunity to turn the Mexican public against the union. However, Salinas had motivations other than economic efficiency and Pemex's performance for attacking the union. The 1988 Mexican elections were corrupt and illegitimate (it is debatable whether Salinas would have won if the elections had been fair) and the union leader at the time had shown support for Salinas' non-PRI challenger, who was none other than Cuauhtémoc Cárdenas (see section 2.1 above). Thus, the Salinas battles with the union were more political than anything else, and it is far from certain that a confrontation today would have positive outcomes for Pemex. Instead, the union has recently shown a willingness to accept some reforms, especially those that channel benefits to their leadership—a strategy that, on balance, explains why reforms have not diminished the union drag on Pemex's performance and have allowed the union to preserve a close relationship with PRI, which in turn has strengthened the union's ability to channel reform initiatives to its favor.

2.3 Corruption

Corruption in Pemex seems to come from several sources, though it is exceedingly difficult to measure its extent.

There seems to be little doubt that the union is not only very powerful, but also a primary source of corruption. Union leaders are able to evade responsibility for even big scandals such as Pemexgate with little trouble. It helps, of course, that the most influential of the union leaders actually serve as senators or deputies in Mexico's congress where they gain political leverage as well as immunity from prosecution. And even though union members may know that their leaders grow wealthy from corruption and that reforms might actually better the average worker's lot, they are reluctant to risk losing the stable stream of benefits assured by the union. Still, at least one journalist blames the Mexican Congress for the union's power within Pemex, saying the union is only as powerful as the government allows it to be. Indeed, Congress hasn't been tenacious in investigating and prosecuting union members. Others agree that a change in union leadership – and a "fix" that makes the leadership more accountable – could go a long way towards improving Pemex's culture and performance (PESD Interviews 2006-2007).

Pemex executives place a lot of the blame for Pemex's internal dysfunction on the union, saying that "the system is made for corruption" (PESD Interviews 2006-2007). As an example, one senior executive cites wasteful union employment. In most oil companies, average employment at a refinery

that processes 200,000 barrels of oil per day is eight hundred people. (Refining is a highly automated operation and some companies achieve those kinds of refining volumes with as few as two hundred workers on station—four shifts a day, fifty workers per shift.) But a Pemex refinery of the same size and capacity employs – through no choice of management – over four thousand workers. Of these, half are "unspecialized" (i.e. uneducated or untrained), with no clear job descriptions or duties. Thus, management concludes that the real problems with its money-losing refining operations are not finances, old technology, or other inefficiencies, but unnecessary staffing through union-padded payrolls. The company says it has invested $1 billion annually in refining since 1998 but is unable to yield a positive return on the investment. In 2006 it lost more than $3 billion in refining even though the refining sector world-wide had one of its most profitable years (PESD Interviews 2006-2007). Management also feels that it is not allowed to compare rates of return in refining projects with those of exploration and production because of the employment issue. It is a tricky issue to address publicly, because of misinformation held by the general population that the large employment numbers are necessary because refining must be a labor intensive business (a myth the union actively promotes, according to Pemex executives).

There is also corruption within Pemex outside the immediate scope of the union, and it is extremely hard to tell how high it goes or where it stops. In general, top Pemex managers are very well paid and closely monitored, so it is presumably harder for them to engage in large-scale graft. Still, even the head of a Pemex subsidiary admits that 95% of the corruption investigations undertaken by Mexico's SFP (the government's transparency and monitoring ministry discussed above) fail to gain a prosecution. He considers the investigations a waste and thinks that the only people that get caught are the small fish that are "too dumb to get away with it." Management's bottom line is that so long as Pemex employees and managers are rewarded for "checking boxes," that is for following government-imposed regulations that are disconnected from the business, rather than being held personally accountable for performance and results, corruption will not cease. Executives are also pushing for strong internal auditing of the subsidiaries, which is currently non-existent.

Corruption also seems to be a very real concern with the field services companies Pemex contracts with for many of its projects (see section 2.5 below). They are often involved in contract padding and other illicit acts (PESD Interviews 2006-2007). Even though these contractors publicly complain that the closed-off Mexican petroleum sector prevents direct competition with Pemex, as one journalist points out, they "keep working with Pemex and make lots of money, so it must not be too bad a deal for them." A public servant at Hacienda says that while companies like Halliburton may not

treat Mexico quite as badly as they do Nigeria or Angola, they certainly do not come to Mexico with respect and honesty as top priorities.

Top executives at Pemex agree (PESD Interviews 2006-2007). They say that while many of Pemex's own employees – most notably oil field supervisors – are unquestionably corrupt, it is the contractors who are most to blame for the corruption. It is the outside companies, they maintain, that come to Mexico with corrupt motives to benefit from "the rigged system." The solution, according to the unhappy managers, is for Pemex to develop the capability to oversee its contracts and make use of its massive market power. The company's CFO suggests that joint ventures and "other straitjackets" are viable ways to "control" the company by giving it less discretion over how it manages the services it procures.

2.4 Access to Customers

When it comes to oil and its derivatives, Pemex is the exclusive downstream operator in Mexico. Its refining subsidiary supplies 100% of the domestic market for gasoline, diesel, jet fuel, and fuel oil (i.e. fuel that powerplants use to make electricity). This domestic market for refined products accounted for almost $40 billion of Pemex's $97 billion in 2006 revenues[28] (Pemex Statistical Yearbook 2007). Meanwhile, sales between the various operating subsidiaries are also substantial. Pemex Refining gets all its crude oil from Pemex E&P. The remainder of E&P's sales are to customers on the international market through the PMI trading arm – overwhelmingly to the United States.

2.4.1 Gasoline Sales

Even though Pemex is the sole downstream operator in Mexico, it does not actually sell gasoline to consumers. All but a handful of Mexico's 7000 gas stations, although formally branded "Pemex," are actually concessions managed as private franchises. This arrangement, in place for over 50 years[29], is a considerable drag on the company's overall public image. The gas stations are by far the most visible Pemex symbols in Mexico and the most "direct" way that consumers interact with Pemex. In fact, during the NAFTA negotiations, Mexico insisted, for psychological reasons, that Mexico would continue to have only "Pemex" branded gas stations. Unfortunately, these stations are notorious for low quality gasoline (e.g. diluting it with water or fuel oil) and outright fraud (e.g. giving 9 liters of

28 The overall domestic market, which includes natural gas and petrochemicals, was about $50 billion in 2006.

29 The current way in which gas stations are franchised came into effect during the Salinas administration, but concessions from Pemex to private gas station operators were in place long before that and essentially amounted to the same thing as franchising.

gasoline for every 10 charged). Pemex management rejected a 2003 proposal to put the gas stations under its direct management. Nevertheless, in an effort to boost its image, Pemex tried to take away the concessions from a large number of service stations only to have a judge rule that the violations of the accused stations were not reason enough to do so. More recently, Mexico 's Attorney General for Consumer Protection (known as "Profeco") shut down 20 fraudulent stations across the country (Frontera Norte Sur 2006). Pemex has also been renegotiating a 1992 contract with its franchisees, insisting on more leeway in verifying retail distribution practices and asking stations to install modern fuel pumps with tamper-proof meters. Federal regulations now actually require that the outdated pumps be upgraded, but the mandate has caused an uproar among station operators who claim they will suffer severe financial harm.[30] A threatened February 2006 national strike by the franchisees was called off only after the Interior Ministry agreed to a one-year delay in implementing the new rule (Frontera Norte Sur 2006). At the same time, the Profeco even toned down its inspections.

The ongoing difficulties with the gas stations – seemingly not of Pemex's own making – are an unwelcome distraction for Pemex management, which faces much larger and more fundamental management problems. Nevertheless, it is a distraction that Pemex cannot afford to ignore due to the public image implications. Consumer unhappiness has made its way into the government, with whom Pemex already has a tense relationship. The Economy Minister under Fox claimed that Mexican consumers lose about $2 billion dollars per year because of irregular gasoline sales (Frontera Norte Sur 2006). And during the 2006 election year, the Mexican Senate jumped into the gasoline fray, calling for testimony from officials. Meanwhile, the minister of SEMARNAT (environment), said his agency also would work in tandem with other federal agencies "to get to the bottom of this very carefully."

2.4.2 Subsidies

Pemex – at least when it comes to gasoline – does not offer subsidies or other similar arrangements for end customers. During the 1970s and 1980s gasoline was highly subsidized. But that led to large-scale smuggling and crime across the US-Mexican border. Partly as a legacy of that history, today a liter of gasoline tends to cost a little more in Mexico than it does in the United States. The high price of gasoline is in part due to a policy decision to let fuel prices float with the market and partly because Mexico is a net importer of refined products – a large portion of the oil extracted from Mexican soil by Pemex E&P must first be exported to the United States for refining before being re-

30 According to the Profeco, over 20,000 pumps need to be discarded because they are more than 10 years old.

imported by Pemex Refining for eventual sale to the Mexican market. Nevertheless, despite the lack of customer subsidies, Pemex is not, in fact, free to pass along all its costs of providing gasoline customers thanks to a tax known as IEPS that is described in section 3.1.3 below. In relevant part, Hacienda sets the retail price of gasoline, which is the same for all gas stations across the country, except for a special slightly lower price in the north border region (in order to discourage reverse smuggling from the US into Mexico).

Meanwhile, state-owned power companies Comisión Federal de Electricidad (CFE) and Compañía de Luz y Fuerza del Centro (LFC) are major Pemex customers (Carreón-Rodríguez, Jiménez, and Rosellón 2007). These two companies provide electricity to most Mexicans and operate power-plants that run on natural gas and fuel oil purchased entirely from Pemex.[31] Fuel oil power plants, which are far worse for the environment than natural gas ones and also more costly to operate when fuels are charged at market prices, dominate the Mexican electricity sector today mostly because of the historically tight relationship between Pemex and the state-owned electricity utilities. Throughout the 1970s and 1980s, Pemex actually sold fuel oil to the power sector at only 30% of its opportunity cost, an under-pricing that amounted to an implicit subsidy of about $1.5 billion annually. These days, it can be argued that it is CFE that subsidizes Pemex because the fuel oil it purchases is essentially a very low quality non-commercial product that Pemex would be unable to sell for a meaningful price to anyone else at home or abroad[32] (PESD Interviews 2006-2007). In any event, the development of a low quality fuel-oil based power sector in Mexico has had serious ramifications, as that sector's low demand for natural gas is a major reason why Pemex's gas operations remain "a poor second cousin" to oil production, which continues to dominate all other Pemex activities[33] (Carreón-Rodríguez, Jiménez, and Rosellón 2007). Fuel oil sales to the power sector accounted for 11% of Pemex's 2005 domestic sales, even if at a great cost to the environment and overall efficiency for

31 The LFC company does not use heavy fuel oil and only buys natural gas from Pemex.

32 Officially, Hacienda allows fuel oil prices to float and CFE is supposed to pay a "market price" for that product, though that notion is somewhat difficult to define when there are essentially no other real customers for Pemex's low-quality fuel oil other than CFE.

33 The last 15 years have actually witnessed important improvements in Mexico's energy mix, with natural gas making the most significant gains. For example, conventional thermal energy production in the country shifted from using predominantly fuel oil (67.1% in 1993, 47.1% in 2002) to a significant increase in natural gas (15.5% in 1993, 29.8% in 2002). Within a few years, natural gas is expected to represent a majority of total conventional thermal energy generation. Nevertheless, oil continues to dominate Mexico's overall domestic energy production. In 2001, hydrocarbons still represented 89.4% of primary energy production in Mexico, with crude oil as the main source (70% of the total), followed by natural gas (18%). Electricity, the second most important source of primary energy production, accounted for only 4.6% of overall domestic energy production, giving a sobering perspective to the natural gas gains in conventional thermal energy generation discussed above.

Pemex and CFE[34] (Pemex 2008). Moreover, the CFE – whose customers' costs are heavily subsidized by the government – is continually piling up debt when buying products from Pemex. No one seems quite sure whether it is ever expected to repay its debts or whether, in time, Pemex will indirectly end up subsidizing these electricity customers (PESD Interviews 2006-2007).

2.5 Corporate Relationships

Pemex has relatively little interaction with the rest of the world's oil majors. Direct competition is minimal since Pemex has exclusive access to its domestic market and virtually no operations abroad. Mexico is the only major Latin American country that doesn't allow foreign oil majors to participate in oil exploration and production (Smith 2004). The only real competition Pemex engages in is the export of crude oil and some petrochemical products through PMI, but even that is done through long-term contracts with a limited set of customers rather than on the spot market.[35] Meanwhile, the one and only foreign operation Pemex has is a refinery in Deer Park Texas that is run as a joint venture with Shell where, in fact, Shell is the exclusive operator.

This is not to say, however, that Pemex is somehow isolated from the rest of the global industry. Far from it, the company has extensive relationships with many companies in the petroleum business – both domestic and foreign. However, these tend to be companies that construct infrastructure and perform various field services for Pemex. Over the past decade, capital expenditures, particularly on long-term infrastructure, have increased dramatically (see section 3.2 below). But Pemex is unable to develop most of these projects on its own – a result of the previous two decades of minimum infrastructure investment and the elimination of Pemex's historically huge construction business in 1992. As a result, Pemex has increasingly relied on private contractors. At the same time, the government has an interest in actively encouraging the hiring of private contractors because that enables the use of alternative financial mechanisms (see section 3.2 below). Thus, due to practical and budgetary considerations, the private sector has become very important in many of Pemex's key projects, including various construction and engineering services on pipelines, platforms, and other infrastructure. In all cases, however, Pemex hires the other companies strictly as contractors that do not

[34] Although it should be noted, once again, that the situation today is not as bleak as it once was and that there are some hopeful signs of improvement. Between 1995 and 2001, power generation in Mexico grew almost 52% as did harmful emissions in absolute terms. However, emission *intensity* dropped (3.9% for CO2, 12% for SO2, and 10.8% for total suspended particles), as a result of a technological switch from conventional power plants to more efficient combined cycle plants, which also led the power sector to double its consumption of natural gas in the same period (and even begin to drop the consumption of high sulfur fuel oil in 200).

35 This is, in large part, because Pemex's heavy crude oil requires special refineries and is not as amenable to the fungible commodity status that exists for higher quality crudes on the oil market.

– and cannot, under the constitution – share in any of the risks or equity of the projects they participate in.

By far the most important project that Pemex undertook and then contracted out to other companies was the nitrogen injection system for the Cantarell oil field. Fifteen years after its discovery in 1976, production from this biggest and most important oil field in Mexico started dropping. In response, Pemex decided to build a large nitrogen separation plant near the field that would inject high-pressure nitrogen into Cantarell to emulsify and push out a larger fraction of the remaining oil. The project began in 1996 and involved several important contractors. Bechtel Corporation prepared a conceptual design study for the project and stayed involved in other phases. Meanwhile, the nitrogen production plant for the project – the largest of its kind in the world – was built by Linde Gas, and is now owned and operated by a joint venture that is majority owned by BOC Gases (which was itself acquired by Linde in late 2006). The Cantarell gas injection project wound up transforming Cantarell into, at the time, the world's second largest oil field by production volume.

While Pemex's heavy recent use of subcontracting has helped it implement projects like the Cantarell injection and invest in many other large-scale projects it could not have built on its own, the exclusively contractor-type relationship Pemex has with other companies is fraught with problems—because Pemex largely lacks the capacity to manage the contracts of such a large-scale projects portfolio (see section 2.7), which puts it at a significant disadvantage when negotiating, structuring deals, or otherwise doing business with the field services companies.

There are some recent signs, however, that the company may be starting to shift strategies when it comes to partnerships away from the exclusively subcontractor model. In 2001, Pemex signed a deep water technological cooperation agreement with Brazil's NOC Petrobras. The Brazilians are recognized experts in deep water drilling, while Pemex had nearly no competence in that area. Perhaps as a result of this relationship and other "conversations" that Pemex says it has had with the world's oil majors on the topic of deep water – such as with Norway's Statoil – Pemex drilled its first ever deep water oil exploration well in late 2004 (Pemex 2008). This was a remarkably late date for Pemex to be just starting in the deep water business, as it has long been known that discovering and tapping deep water reserves is critically important in avoiding a massive drop in Mexican oil output. The western Gulf of Mexico – in Mexico's territory – is probably rich in oil and gas but has barely been explored. However, given the company's strategic focus on maintaining high prompt annual revenues through its existing Cantarell operations, it would have been very difficult to invest in deep-water exploration, especially if expensive subcontracting were needed, at an earlier date.

Another signal of changes in the way that Pemex interacts with its subcontractors are the multiple service contracts (MSCs) that Pemex used in its gas subsidiary. Following gas and electricity reforms in the mid-'90s, the company divested most of its gas transportation and distribution operations. It then used MSCs as a way to essentially outsource the entire upstream exploration and development of its gas fields. This was a more meaningful way to partner with other oil companies in exploration and production. Rather than sign a series of contracts with several companies for a given project that it would oversee, Pemex could sign one MSC with a single partnering company that would take charge of implementing the entire project. In effect, the MSC would allow Pemex to correct for its weak capacity to manage large and complex engineering projects by delegating a larger fraction of the management authority to more competent outsiders. The problem with MSCs, however, was that the partner companies were not allowed to take equity positions in projects. Instead, the company entering into a MSC with Pemex had to be guaranteed a fixed rate of return – something that is difficult to do for inherently uncertain E&P projects, especially in exploration. Thus, in practice, the gas MSCs yielded relationships that were more like those of subcontractors rather than risk-incented "partners."

Neither Pemex nor the companies that signed MSCs have been pleased with the arrangement and both sides would have preferred the partners to be able to take a risk position in the projects. But the Mexican Constitution does not allow for that. Even without giving away an equity position in the gas projects, the constitutional validity of the MSCs that Pemex signed was called into question. In 2005, Pemex reluctantly suspended MSC tenders following recommendations from the autonomous congressional audit office (Auditoria Superior de la Federación) to stop using MSCs until the Congress clears up the constitutional boundaries of what private companies can do in Mexican hydrocarbon exploration and production. Besides the constitutional uncertainties, Pemex faced other problems with its gas MSCs. Outside observers think that both Hacienda (which encouraged Pemex to use these contracts because they offered a novel way to attract outside capital) and Pemex had a wrong impression of the foreign oil companies in assuming that they were eager to accept any condition on the opportunity to get into the upstream Mexican hydrocarbon operations (PESD Interviews 2006-2007). But the terms of the contracts and the rates of return that Pemex offered in its early MSCs proved unattractive to the world's oil majors. It was a rude awakening for Pemex and the government when very few outsiders bid to develop the blocks of the Burgos Basin; no block received more than two bids. In addition, those companies that did enter the Basin have had a generally negative experience (PESD Interviews 2006-2007).

Despite the troubles with MSCs in its gas operations, all the players – Pemex, Hacienda, and the

international oil companies – appear eager to extend a similar scheme into Pemex's upstream oil operations (PESD Interviews 2006-2007). Entering into these large contracts, whereby a party other than Pemex would be tasked with managing the overall project may be the most efficient way currently available for Pemex to develop its complex or deep water oil fields, where it simply lacks the technology and human capital to manage these projects. Pemex is already developing such contracts for oil production, although the prior experience with MSCs has made that term "taboo" and the company will call them something else before implementation. Executives at Pemex E&P also say that unlike the first round of gas MSCs, the company is designing these new contracts a lot more carefully, to make them more attractive to the companies it hopes will sign them and in order to avoid "working on the [constitutional] legal edge" as they did before.

In addition to oil production, Pemex would like to use MSC-like contracts for oil exploration, pipeline construction and maintenance, and field development (PESD Interviews 2006-2007). One example of this is the development of a contract for the operation and maintenance of pipelines in the Mexican state of Campeche – a project that, in Pemex's hands, has often been delayed for lack of capital and management attention. Other contracts under development involve deep water activities and the development of the complex on-shore Chicontepec field (see section 4 below). While efforts to implement MSC-like contracts are well under way, it is ultimately unclear whether they will come to fruition. Legal restrictions, say Pemex E&P executives, make it very hard to design MSC-type contracts for oil exploration and other inherently risky projects because a pure service contract without equity incentives cannot adequately capture the attraction of such projects for the world's oil majors. For their part, however, the international oil companies remain interested in upstream Mexican exploration and production activities, so long as an attractive scheme and prospects for return become legally available. In addition, Hacienda has signaled that it would approve of Pemex's efforts to extend MSC-type relationships into oil. Nationalist political forces have not yet focused on these hypothetical new relationships, nor have the courts, and thus their political and legal viability remains untested.

Corporate relationships like MSCs and the slowly developing relationship with Petrobras (which President Calderón recently promised to expand) offer hope that Pemex might be creating a structure that would allow it to become more efficient by becoming more tightly linked with its better peers in the industry. But these developments, without legal reforms that permit Pemex to do even more, are probably inadequate. For example, Pemex claims that it is not giving anything in exchange "at the moment" as part of its deep water collaboration with Petrobras. That is because if Pemex were to give anything in return other than money – that is, if it were to treat Petrobras differently from just

another subcontractor – it would probably violate the Mexican laws. Given such a climate, it is hard to imagine corporate partnerships that would offer performance improvements on Pemex without significant legal – including constitutional – reforms in the oil sector to permit strategic risk-based partnerships that are the main vehicle for the industry. Such reforms would surely be difficult to attain in Congress, although President Calderón is probably better positioned for success than his predecessor due to his knowledge of the industry and political backbone.

2.6 Technology and R&D

As already mentioned, a major reason why Pemex relies so heavily on contractors for infrastructure construction and field services is because of its poor internal capabilities to deliver such projects. (And to some degree, no major oil company internalizes all functions such as field services.) Simply put, Pemex severely lacks modern technology and performs very limited research and development. The company essentially has no internal expertise in technological development or implementation, which has led to increased outsourcing. In fact, top executives admit that there is no technological planning or development within Pemex today (PESD Interviews 2006-2007).

But as mentioned in the historical overview section of the paper (see Part II), it appears that Pemex did, at one point in its history, have a highly competent internal engineering culture that has since largely evaporated. Some credit this culture as having come from the Mexican Petroleum Institute (IMP), an organization that used to be the company's technology arm in the 1970s (PESD Interviews 2006-2007). Others say that the IMP never actually became a truly good research institute, but was always an arm for contracting out projects that Pemex itself could not handle, as well as a place for employee training. My assessment is that IMP ensured that Pemex engineers were well trained and supplied the company with fairly advanced (for the time) technologies during the years that Pemex was primarily in the business of developing the country's infrastructure and reliably supplying Mexico with energy from hydrocarbons. Those goals are less central to the company today[36], and symptomatic of that shift is that the IMP, while still run by Pemex, is now mostly just a service arm that has been reduced to a relic due to budget cuts.

The consensus for the reasons behind Pemex's loss of its engineering and technology culture are the country's foreign debt crisis of the 1980s and Mexico's geology. As described earlier, for more than

[36] Although it should be noted that energy development is still important in Mexico, as nearly 70% of public investment is directed to energy projects. In addition, Mexico's electricity coverage extends to over 95% of the population, one of the highest coverage capacities in Latin America.

a decade after the debt crisis, Pemex's production was kept steady with no new investment in infrastructure or exploration. The government could impose such restrictions on Pemex in the first place because Mexico was blessed with easily accessible hydrocarbon resources. As a result, until just three years ago, Pemex never even bothered developing any deep water expertise, despite the fact that it had long been an open secret that discovering and tapping deep water reserves was a key to avoiding a massive drop in Mexican oil output once the shallow fields dried up. Even at this critical time in the company's reserves situation (see section 4 below), Pemex executives say that the company is still primarily developing low cost reserves that don't require immediate technology changes (PESD Interviews 2006-2007). Having failed to develop new skills in Mexico, the firm has had no choice but to rely heavily on the field services companies and other subcontractors – the same ones executives blame for excessive corruption – to deliver the technology necessary to maintain production levels.

For now, Pemex's managers say that they can go to the international market of oil services providers for all their technological needs. They also say that Pemex is about to be put on a "fast track" to gaining deep water expertise due to its nascent links with Petrobras and other firms capable in the deep. Management also indicates that over the next two to three years, Pemex's investment in complex fields will increase substantially (PESD Interviews 2006-2007).

It remains to be seen whether Pemex can internalize the more advanced technologies it seeks from its contractors. One idea floated by Pemex management is to use the knowledge of technological developers such as Halliburton to rejuvenate the IMP. The scheme, they think, might mean that Pemex might not need to contract out the project on the next aging field that requires a nitrogen injection system of the type applied in Cantarell. For now, however, this seems to be little more than a dream, and Pemex will have to rely heavily on outside technological help for the foreseeable future.

Even if Pemex manages to improve its technological expertise in E&P in the coming years, there is little reason to show similar optimism for its other operating units. Over the years, Pemex's refining, gas, and petrochemical subsidiaries have become even more neglected and outdated than its upstream oil and gas operations. At the same time, these subsidiaries are not experiencing anything close to the massive new investments that have gone into E&P this decade. For example, even though several billion dollars were invested in modernizing Pemex's five refineries, the upgrades went toward improving these facilities' ability to process heavy crude oil as well as their ability to output higher quality products by taking out more of the sulfur common in Mexican crude. But the key operating inefficiency with the Mexican refineries – the fact that they are extremely energy inefficient – went unaddressed. And while management points to overstaffing as another serious problem with refining,

antiquated technology is the key problem that continues to plague this subsidiary, as well as the uncompetitive petrochemical and gas ones.

It is important to note, as well, that there are skeptics who question Pemex's will and motivation to regain its technological competence. They note that IMP's budget cuts have not been restored despite the professed interest by Pemex management in technologically sophisticated operations and the culture of reliance on contractors (PESD Interviews 2006-2007). Some analysts point to the possibility that Pemex management and certain government officials are purposely hobbling the firm so as to speed the path to privatization, although in my interviews I find little evidence to suggest such a conspiracy is afoot.

2.7 Capacity to Apply Human Capital

A common thread that underlies Pemex's already-described problems is that the enterprise is unable to apply human capital. While the absence of specialized human skills is easily observed at the firm, equally troubling is the lack of efficient management capabilities. The problem is not that individual executives or managers are poorly trained or not hard working. Rather, the company lacks an institutional ability to manage its increasingly complex operations.

For the nearly two decades during which Pemex's production remained constant and minimal investments were made in exploration or maintenance, inadequate funding was the binding constraint on the company's development. However, this no longer seems to be the case. Large new investments have been approved in recent years and Pemex has moved towards a strategy of "maximizing present value" and large-scale subcontracting of its most important projects. The binding constraint now seems to be the ability to manage this sizable and complex new project portfolio.

Given this situation, some observers are concerned about whether continued large-scale investment in Pemex is justified (PESD Interviews 2006-2007). One journalist says that the returns on the large capex investments by Pemex over the past five years have been slow in coming – indeed, it appears that the company is unable to spend wisely the $20 billion per year it now says are needed in the near future. Pemex's recent mission has been simply to sustain daily production, which means that the company has wound up signing many large contracts with many subcontractors at once. And while the foreign field services companies seem to have found a very favorable operating environment in Mexico (whereby they can get large contracts with little *strategic* scrutiny) neither Pemex nor the government have the capacity to police them to ensure they're getting their money's worth.

A senior executive at E&P, for example, stated that what Pemex really needs to learn is modern

project management from its contractor service companies, as management skills would be even more important than any technology transfer Pemex could gain from these companies (PESD Interviews 2006-2007). Even though Pemex can go to the market for its technological needs, it is much harder for it to do the same for management capabilities. The government seems to agree. Although most of the public debate focuses on the thesis that Pemex is starved for cash, Hacienda says that any further fiscal reforms that free up more cash for Pemex must coincide with changes in corporate governance to enable Pemex to better manage these investments.

This failure to develop and manage human capital is not new for Pemex. Back in 1991 when the company formed the refining joint venture with Shell at Deer Park, Texas, neither people within Pemex nor the Mexican government showed any interest in learning or transferring skills that would have been much more readily available through the partnership (PESD Interviews 2006-2007). A proposal was actually made to have a regular staff exchange with the refinery. The idea was that Pemex's own refineries could learn a lot from the way this refinery in Texas was operated by Shell. However, when put to a vote, the proposal received the support of only one board member of the Pemex Refining subsidiary. The rest of the board, and others within Pemex, thought that such an exchange was irrelevant and were content to have Shell as the sole operator of the refinery with Pemex merely receiving processed fuels from the venture and going about its own refining business independently of this project.

3) Finances

For most of its seven decade history, Pemex's finances have been closely intertwined with Mexico's federal budget. By most accounts, the company's tax payments currently account for over a third of the government's annual budget. This has led many observers (including some local politicians) to warn against the serious consequences that may result if oil prices fall or if Pemex's production falters from the recent record high[37] (PESD Interviews 2006-2007).

Indeed, a drop in crude prices helped spark Mexico's foreign-debt crisis in the early 1980s (Smith 2004). And despite twenty-five years of changes in the company's structure and operations

37 Interestingly, Pemex has not benefited from the current high oil prices as much as it has during previous spikes. The high costs of the large quantities of gas and refined products that Pemex imports these days are offsetting gains from high prices in its crude sales. As an example, Pemex reported a 60 billion peso increase in "cost of sales" for 2005, compared to 2004. Of this, a full 53 billion pesos (88%) was attributed to increased prices for imported products for resale. The 53 billion also accounted for two thirds of Pemex's entire increase in all operational costs and expenses for 2005. Moreover, Pemex sells mainly a heavy crude that fetches a price much lower than the light, sweet varieties that are the international benchmarks.

(starting with nearly two decades of neglect followed by a rapid expansion of production and capital investments), it can be argued that Pemex's (and Mexico's) financial situation have returned to where they were when the last major crisis occurred. In the early 1980s, Pemex was seen as a cash cow, which led to excessive reliance on oil revenues. During the presidency of José López Portillo (in office 1976-1982), vast new oil discoveries were announced regularly – chief among them, Cantarell. At the time, despite huge foreign and domestic debt, banks readily lent even more money to Mexico on the hope of even bigger oil finds and production. The Mexican government's excessive reliance on oil revenues and high world oil prices proved disastrous once oil prices fell and the government could no longer readily take out massive new loans merely to service billions of dollars in interest on earlier debt.

Just as treating Pemex as a cash cow in the early 1980s proved delusional, so too today there is a dangerous over-reliance on continued high production volumes and high oil prices. While international banks do not lend huge sums of money to Mexico as readily as they once did, Pemex has nevertheless had little trouble raising nearly $100 billion on capital markets in less than a decade. As it once did with Cantarell, Pemex is now actively touting the potential of its deep water reserves. Meanwhile, the government budget continues to be wholly dependent on the company, meaning that Pemex has huge revenues and pre-tax income but nevertheless consistently risks running at a loss thanks to unbearable taxes.

3.1 The Tax System

Over the past 5 years, Pemex has paid out slightly over 60% of its total revenues in royalties and taxes. The taxes imposed on Pemex for most of the last fifteen years (from 1994 to 2005) fell into three main categories: duties for hydrocarbon extraction and other similar similar taxes, a so-called "excess gains duty," and a special tax on gasoline sales known as "IEPS." The largest – by far – of these were the hydrocarbon duties (87% of all tax payments in 2005), followed by the excess gains tax (10%) and the IEPS (3%). These taxes rose with revenue, which meant that the effective tax rate on Pemex increased as oil prices rose.[38] This, in turn, made it difficult for Pemex to take advantage of the recent record oil prices for either reinvestment or debt reduction, both of which are critically needed. By contrast, all of the best performing NOCs in this study have been able to set aside at least some of

38 For example, while sales increased by 16% and revenues by 13% from 2004 to 2005, the amount Pemex paid in taxes rose by a full 18%, pushing Pemex from a 61% to a 62% effective tax rate.

the surplus revenues from higher oil prices for E&P activities and other investments.

The Mexican Congress finally responded to many years of complaints and gloomy warnings from Pemex about its tax burden by passing a new tax law that went into effect in 2006. The new regime and its effects to date are described below, as are the Calderón administration's even more recent tax reform. Interestingly, the Congress had earlier approved another tax reform bill that would actually have let Pemex keep more money than the system that actually went into effect in January 2006. But President Fox vetoed that bill, saying at the time that any tax reform bill must also include corporate governance reform measures – a noble goal that was never realized in practice, with the result that Fox eventually signed a watered-down bill that contained nothing on the subject (Malkin 2005). A more plausible rationale for the prior veto, therefore, is that despite voicing concern over Pemex's financial burdens, the Fox administration (and Hacienda, in particular) was much more focused on macroeconomic policies (Malkin 2005; PESD Interviews 2006-2007). For the Fox administration, as for most administrations before it, assuring that government would retain full control over the budget took priority over tax reductions for Pemex. Hacienda's top priority usually is to present a balanced budget.

3.1.1 Duty for Hydrocarbon Extraction and Others

In 2005, and for a decade before, the main tax that Pemex had to pay was a "Hydrocarbon Extraction Duty," set at 52.3% of net cash flow difference between crude sales and extraction costs. Related to this duty were other taxes known as "extraordinary" and "additional" duties triggered by different means and consisting of 25.5% and 1.1% of the net cash flow respectively. The next highest tax that Pemex paid was the "Hydrocarbon Income Tax," which was a straight-forward 35% income tax. This was the one tax that was not primarily based on revenues but rather on income (revenues minus operating costs and expenses). In addition, Pemex has to pay the government, as the sole shareholder, a guaranteed annual dividend, but this is negligible compared to the firm's tax payments.

3.1.2 Excess Gains Duty

The most surprising and inefficient tax Pemex has had to face is the "Excess Gains Duty." This tax required Pemex to pay a fixed percentage – determined annually, but usually set relatively high – on all revenues from crude oil sales above Congress's "budget base price," which was always set very conservatively. Thus in 2004, Pemex paid out 39.2% on all crude sales above $20/barrel, while in 2005 the excess gain payments were 29.2% of crude exports above a $23/barrel threshold. Meanwhile, the

actual prices of Mexican crude oil soared above these budget thresholds to over $30 and $40 per barrel for 2004 and 2005 respectively. In the end, the "excess gains" that Pemex was supposedly making from high oil prices were what wound up breaking the camel's back and forced the company to run at multi billion-dollar losses in 2004 and 2005.

Perhaps recognizing that this tax was proving too costly for Pemex at a time of skyrocketing debt and critical investment needs, Hacienda and Congress eased its burdens (if ever so slightly) during the last two years that the tax was in effect. But rather than significantly reduce the tax directly, Hacienda decided to "refund" some of the taxes that it still considered due so that they could be spent on capital improvements. In 2004, Pemex was refunded the full duty (around $2.5 billion), while in 2005 the refund was significantly reduced and defined as only a 50% refund of the tax paid for exports sold above $27 per barrel. Even though these refunds helped somewhat, Hacienda remained firmly in control and retained approval authority for each peso that the company was allowed to keep for capex needs. A significant reform of this tax was a key portion of the new tax regime for 2006 (see below).

3.1.3 IEPS

The IEPS is a so-called "special tax" on domestic sales of gasoline and automotive diesel. It is essentially a gasoline sales tax paid by retail consumers – collected by Pemex at the point of sale and then transferred to Hacienda. However, the amount of tax collected varies constantly because of the way that gasoline prices are set in Mexico.

At the start of each year (with subsequent adjustments as it sees fit), Hacienda decides how much consumers are to be charged for gasoline and diesel at retail stations. In general, Hacienda tries to keep this retail price as high as possible – benchmarking its prices mainly against those in the United States (where retail prices float with the market) as the U.S. prices are widely known in Mexico and parity helps to reduce cross-border smuggling (PESD Interviews 2006-2007).

In the meantime, the actual revenue that Pemex is allowed to keep from its sales of gasoline and diesel is known as the "estimated production cost." Hacienda also calculates this production cost by reference to "an efficient refinery" located in the United States. In other words, the amount Pemex keeps is wholly devoid of any reference to the costs actually incurred by Pemex in oil production and refining.

The IEPS is essentially the difference between the fixed retail price and the fluctuating estimated production cost. Thus, the amount of this gasoline sales tax collected by Pemex is constantly

shifting. Interestingly, during nine months of 2005 and 2006, the IEPS tax actually went negative. Because of high volitility in U.S. prices during that time period, the estimated production cost went higher even than the retail price that the government had fixed for Mexican consumers. Therefore, the government wound up owing money to Pemex, which Pemex credited against other taxes it owed during the third quarter of 2006. This was an obviously undesirable event from the government's perspective and is not likely to be repeated.

The more important result of the IEPS is that Mexico cannot have much higher gasoline sales taxes than the really low retail taxes in the United States (relative to the rest of the world) (PESD Interviews 2006-2007). This is due to the historical gasoline smuggling concerns and the ways that Hacienda, in effect, indexes the Mexican retail market to the U.S. market. Therefore, since the government cannot collect large amounts of oil taxes from end consumers, it must get its oil revenues by directly taxing Pemex through the other taxes. In other words, Mexico's citizens pay relatively low taxes on the oil they use, which means that Pemex must pay an exorbitant amount to the oil-dependent government.

3.1.4 Recent Tax Reforms

Starting January 2006, a new tax regime went into effect for Pemex that builds upon some of the government's tax refund policies of the previous few years. The major goal of the new system is to allow a portion of Pemex's capital expenditure to be funded with internally generated funds rather than constant issues of new debt (Pemex 2008). Pemex's management says it received tax reductions of $1 to $2 billion for 2006 and estimates it will yield an average of $3 to $4 billion annually over the first five years of the new regime. This should be enough to allow Pemex to post an official profit while also opening up funds for investment and debt reduction – although it is unclear whether this measure by itself fundamentally eases Pemex's lack of investment capital since the greater availability of funding from its own balance sheet may result in Pemex losing access to other traditional sources of government-controlled funding. The new regime does not give management everything they had been seeking. In fact, most observers don't think the new tax regime will significantly ease Pemex's debt problems, but they do view it as a positive first step and encouraging sign that the government may finally be responding to Pemex's fiscal imbalance (PESD Interviews 2006-2007).

In tandem with reforms focused on Pemex, the Calderón government has also successfully implemented a broader tax reform. For decades, Hacienda has refused to expand Mexico's tax base. The average Mexican consumer and business do not pay any federal taxes in Mexico. Instead, only a

few large entities like Pemex supply the government with an overwhelming majority of its income. Even though Hacienda has the power and authority to broaden the tax base, it has shown itself unwilling to undertake this difficult task (which is sure to be unpopular amongst the Mexican public). As a result, Hacienda continues to collect punishing taxes from Pemex, and the company continues to shoulder a disproportionate share of the national tax burden[39] (PESD Interviews 2006-2007).

A major advantage of the new system is that Pemex corporate, along with the Refining, Gas, and Petrochemicals subsidiaries will be taxed like most other Mexican companies with income taxes based on revenues less expenses and costs – a regime that could allow refining, for example, to pay taxes that are rooted in real production costs while also keeping a predictable share of the fruits of better performance. Meanwhile, only the E&P subsidiary will continue with significant special tax treatment, but with less onerous burdens than before. The main tax will be the "Ordinary Hydrocarbon Duty," which will set a tax rate based on the difference between E&P revenues and deductions. The most significant change from the old Hydrocarbon Extraction Duty is that Pemex will be allowed deductions for certain activities such as exploration (100% deductible) and facility maintenance. Meanwhile, a "Hydrocarbon Duty for the Stabilization Fund" is a new tax with a rate based on the crude production value above $22/barrel (Pemex 2008; PESD Interviews 2006-2007).

The previously onerous Excess Gains Duty will now be replaced with a slightly less oppressive "Extraordinary Duty on Petroleum Exports," which is defined as 13.1% on exported volumes above the "agreed price under the Revenues Law for the current year." The extraordinary duties are first used by Hacienda to balance the national budget or provide for other unexpected needs. Of whatever is left after that balancing, 40% goes to the aforementioned federal oil stabilization fund, 10% goes directly to the Mexican states, 25% is refunded back to Pemex for capex use, and the rest goes to the Mexican states and municipalities for their own oil stabilization funds (PESD Interviews 2006-2007). As for the federal stabilization fund, by the spring of 2007, it had already amassed over 30 billion pesos. It is supposed to be used exclusively to compensate for falls in oil revenues and does not distinguish whether the drop is because of a fall in oil prices or a drop in Pemex's production. Several other minor taxes, as well as the IEPS, remain in place from the old tax regime.

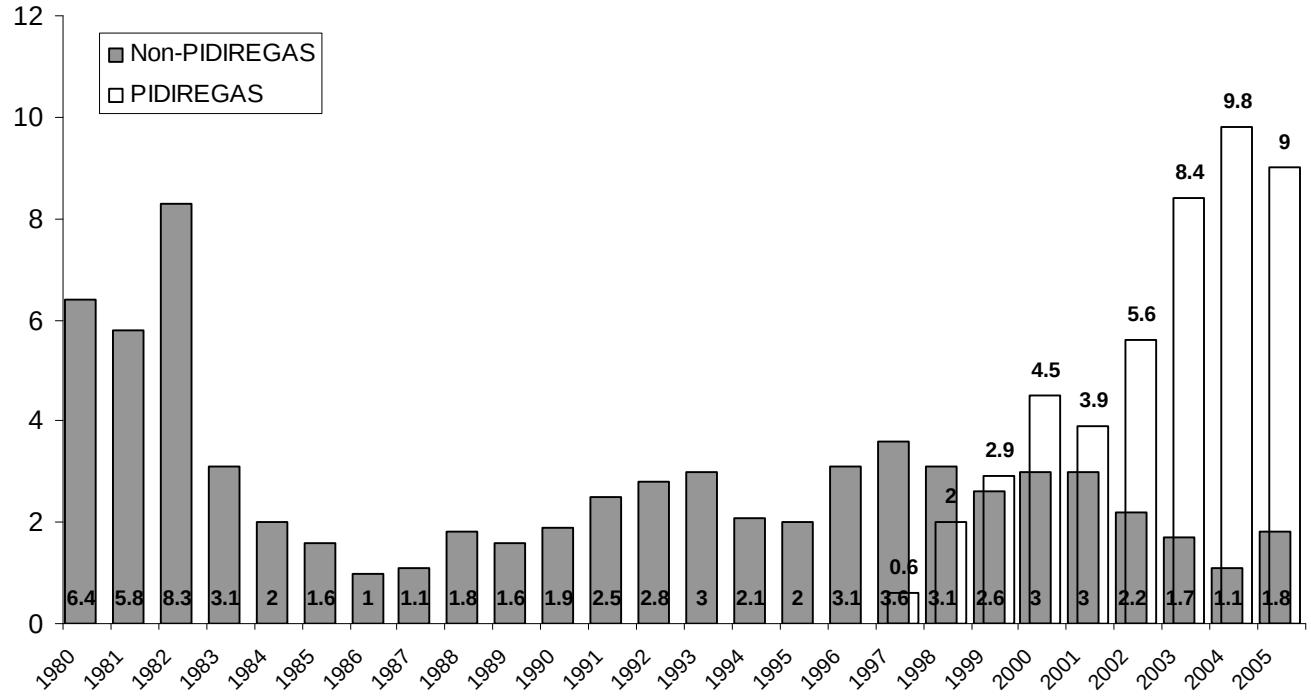
3.2 Investment, PIDIREGAS, and Debt

For all its tax woes, Pemex has steadily increased capital expenditures for the better part of the

[39] Although a Hacienda official recently stated that the ministry's main mission with reform is to reduce the percentage of the federal budget that is oil-dependant to around 20%.

last decade (see Figure 5). And – if things go the way management wants them to – the next few years will see an even more dramatic rise in capital spending. A vast majority of this new investment goes directly into exploration and, especially, production (see Figure 10). Such investment allocation seems well justified, as the worrisome combination of rapidly depleting proved reserves and outdated and wasteful infrastructure requires a huge investment just to maintain current production volumes. Pemex also recently launched its first serious *exploration* projects since the late 1970s.

Figure 5: Pemex Capex 1980-2005 (US$ billion)
(Source: Pemex)



The interesting part of the story, however, is not simply that Pemex is finally trying to address its long-ignored production and exploration needs. Instead, it is the way that Pemex is raising funds for this investment. Pemex has no internal funds for long-term investment as it roughly breaks even or runs a loss each year. Yet over the last eight years the firm has invested over $70 billion. The solution is a financing mechanism that allows Pemex to classify capex projects as "PIDIREGAS."

Depending on whom you ask, PIDIREGAS projects are either a disaster waiting to happen (an investment "cure" that is worse than the disease) or a clever work-around the complicated Mexican federal fiscal system. The catchy acronym translates, in English, as "long-term budget deferred

infrastructure projects" that are, at their core, entirely debt-financed projects.[40] They are the current fashion in Mexican government finance – not just for Pemex. In fact, PIDIREGAS began being used by the state electrical utility CFE in the early 1990s as a way to move the full cost of debt off the state utility's balance sheet – blessed fully by Hacienda which saw the looming need for investment in the power sector but no cash flows that could cover the cost. Only in 1995 was this practice blessed by Congress and codified into the income laws.[41] PIDIREGAS currently represents over 45% of all public investment in the country. By the middle of 2006, the government was already paying $7 billion per year just to service PIDIREGAS debt, a number that was then expected to climb to $20 billion annually by 2011 (PESD Interviews 2006-2007).

Pemex in particular has enthusiastically adopted the use of PIDIREGAS. The proportion of Pemex capital expenditures that are PIDIREGAS (see Figure 5) has grown steadily from 39% in 1998 – the first year that PIDIREGAS came into use – to 83% in 2005 and 87% in 2006. In general, there are three types of PIDIREGAS projects in Mexico, of which Pemex utilizes two. The first is a build-lease-transfer (BLT) model, where Pemex contracts a project out to a contractor who is entirely responsible – independent of Pemex – for its financing and completion. Only once the project is complete and handed over to Pemex does the company begin to pay the contractor for it. The most significant feature of the BLT PIDIREGAS is that the debt shows up on Pemex's balance sheets only when projects are completed – not during initial approval or years of construction. Even then, an accounting rule permits Pemex to report only the amortization of the project for the current and following fiscal year. (Pemex, however, has chosen to disregard this rule and actually reports the full cost of debt related to PIDIREGAS in its consolidated financial statements.) The second type of PIDIREGAS are similar to the BLT model in that a contractor finances and builds a project without Pemex's involvement or even a reflection of the project in the company's balance sheet until the project is handed over upon completion. At that point, in contrast to the BLT model, Pemex secures debt from capital markets and pays off the project to the contractor in full.[42] Pemex then has to repay this debt,

40 The PIDIREGAS legal framework is defined by the Ley General de Deuda Pública (General Law of Public Debt) and the Ley de Presupuesto, Contabilidad y Gasto Público Federal (Federal Law of Budget, Accounting and Public Expenditure).

41 By that time, the use of PIDIREGAS had caused many legal inconsistencies and questionable actions by people in important positions. Rather than go after the perpetrators, SFP (the public functions ministry discussed earlier in the paper) had no choice but to recommend that the inconsistencies be elevated to law and the scheme be formally legalized.

42 The debt that Pemex takes on under this second PIDIREGAS scenario can be secured through several special-purpose financing vehicles. "Pemex Finance Ltd," a Cayman Islands vehicle, and the "Pemex Project Funding Master Trust," a Deleware trust, were both established in 1998, the year after PIDIREGAS first came into use in Pemex. Their purpose is to finance PIDIREGAS and raise other debt. Pemex Finance operates through the purchase and sale of accounts receivable from Pemex's crude oil sales. Meanwhile, the Master Trust simply funds PIDIREGAS projects through debt

which shows up in full on the balance sheets as soon as it is amassed according to normal accounting practices (i.e. when Pemex raises it from capital markets) (PESD Interviews 2006-2007).

Once one understands the functioning of PIDIREGAS financing, it becomes obvious why it is so favored by Pemex. Essentially, PIDIREGAS enable Pemex to hide its true debt levels because all transactions relating to the projects are initially off-budget if financed by a private contractor. Since many of these large infrastructure projects take several years to complete and deliver, Pemex's reported debt levels are significantly understated.

The major attraction of this scheme is that a project's designation as PIDIREGAS guarantees its financing will be immune from budget cuts and other government meddling. These long-term projects are approved as projects and the financing – because it is contracted from the markets – is untouchable. This stands in sharp contrast to the rest of Pemex's budget, which is subject to considerable change and uncertainty year to year.

In one sense, PIDIREGAS is not fooling anyone, since the Mexican Congress and Pemex's creditors know full well that Pemex (and other state enterprises that rely on the scheme) is indebted well beyond its reported levels. Moreover, there is nothing to suggest that Pemex or its management team have tried to deceive anyone. After all, the company has chosen not to take advantage of the BLT accounting rule (reporting only two year's worth of amortization) that would really let it hide debt from its balance sheet. But there does seem to be a psychological lulling effect in that PIDIREGAS still makes the situation appear not so dire, especially to those not in the know. In fact, rather than encouraging openness and accurate public debt reporting, the Mexican Congress is actually promoting the use of BLT PIDIREGAS. It is as if Congress, recognizing the need for large-scale investments but unwilling to cut taxes or otherwise reform the system, is opting to pull a blindfold over itself.[43] Meanwhile, the normally despondent Pemex management, sensing that PIDIREGAS may be the only viable way to build up any infrastructure, has enthusiastically embraced the scheme. While executives continue to cry for the need to generate investment funds from within, they did not, for the better part of a decade, directly criticize PIDIREGAS or the associated massive debt buildup.

And this is exactly what has some outside observers so worried. The heavy investment of the past five years has already ballooned Pemex's reported debt to over $50 billion as of 2006 (reported

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guaranteed by Pemex, as does the "Mexican Trust F/163," a financing vehicle formed in 2003 to fund PIDIREGAS in domestic currency. It is important to remember that all capex and financing, whether PIDIREGAS or not, require the approval of Hacienda and Congress.

43 The formal reason that Pemex gives for the Congressional PIDIREGAS BLT preference is "due to federal budgetary constraints."

debt for 2007 is down slightly from this figure). And this is just the beginning. Pemex's infrastructure was ignored for so long that despite the recent investment, the company is still in dire need of further large-scale investment, particularly in E&P. Given the tax situation (even under the new regime) there is every reason to believe that most new investments will continue to be funded by debt, most likely as PIDIREGAS. Meanwhile, as a rising number of PIDIREGAS are completed, the company's balance sheets will increasingly reflect its massive leverage. This may, in turn, negatively affect Pemex's good credit ratings and ability to raise further capital on world markets at favorable rates. Finally, it should be noted that Pemex has many investment needs beyond E&P infrastructure buildup, such as in research and development, employee training, and overhaul of its ailing pension system – none of which is eligible for treatment under PIDIREGAS.[44]

Even Pemex's management and the government seem to finally be looking for a way out of PIDIREGAS. Recently, executives at Pemex E&P voiced discomfort with the way that Pemex has financed its capital investment, mostly because of the associated debt (PESD Interviews 2006-2007). Any drop in oil prices would have drastic consequences for the ability to service the PIDIREGAS debt. Hacienda is also looking for new schemes that would allow the company to invest in projects such as deep water exploration. While options such as joint ventures or more flexible contracts remain in the works, viable alternatives to PIDIREGAS are yet to emerge.

However, it is conceivable that alarmism about PIDIREGAS is premature. The credit agencies such as Standard and Poor's are actually not *that* concerned about Pemex's debt[45] (Smith 2004; PESD Interviews 2006-2007). To date, Pemex has had no trouble raising on world markets and maintains an investment grade rating. In fact, credit agencies explicitly treat its debt as quasi-sovereign and implicitly guaranteed by Mexico (Smith 2004). Put bluntly, the state would never let Pemex become insolvent and everybody knows it.[46] Moreover, there is a sense that all the debt amassed is actually doing some good. Every single PIDIREGAS is explicitly linked to critical infrastructure (by law, the cash flow from the projects has to cover at least the cost of the debt and service) and to date, most

44 It should be noted, however, that there is evidence of PIDIREGAS being abused and applied to projects such as maintenance and exploration projects, even though these projects probably cannot pay for themselves as required by the PIDIREGAS laws.

45 See e.g. Pemex's credit ratings and associated reports from S&P, Fitch, and Moody's available on Pemex's web site (http://www.pemex.com/index.cfm?action=content&sectionID=11&catID=66&contentID=114). Pemex's credit ratings were recently upgraded (in September of 2007), justified by the latest tax reforms. But even before the tax reforms of 2006 and 2007, the credit agencies were not very critical of the situation Pemex was forced to operate under and maintained surprisingly positive overall ratings on the company's debt.

46 The "Ley de Concursos Mercantiles" does not allow any state owned company like Pemex to be declared in bankruptcy. In addition, any significant debt restructuring for Mexico – past and future – always involves the debt of Pemex.

projects have successfully boosted production. Therefore, servicing PIDIREGAS debt may not be so difficult after all, precisely because of the increased production and revenues that these projects are meant to bring in the first place. This view, however, is now a distinct minority, as most close observers within Mexico think the government must tame PIDIREGAS and the mounting Pemex debt (PESD Interviews 2006-2007).

4) Hydrocarbon Reserves

Most experts agree that Mexico probably has vast and easily accessible untapped oil reserves. However, these potential reserves – the vast majority of which are in the deeper waters of the Gulf of Mexico – have yet to even be carefully explored, let alone developed. In fact, as discussed above, Pemex does not have the required deep water technology to access them. Therefore, the actual hydrocarbon reserves situation in Mexico is better described as uncertain at best, and quite possibly critical.

According to Pemex, Mexico's total proved hydrocarbon reserves at year-end 2007 were 14.7 billion barrels of oil equivalent, of which 71% were crude oil and 17% were natural gas (see Figures 6 and 7). Astonishingly, this level of combined reserves represented a full 41% drop from 1999 proved reserve levels. Contributing in large part to this rapid decline was the fact that over the six-year period from 1999 through 2005, crude oil production rose 17.2% to about 3.4 million barrels a day without any serious corresponding investment in exploration (Smith 2004). This reserves-production imbalance led Pemex to report steady declining reserves to production ratios from 2003 through 2007 (Figure 8). In short, the company is essentially failing to replace the oil and gas it produces with new developments and discoveries.

Figure 6: Mexican Hydrocarbon Reserves Trend (Source: Pemex 2008)

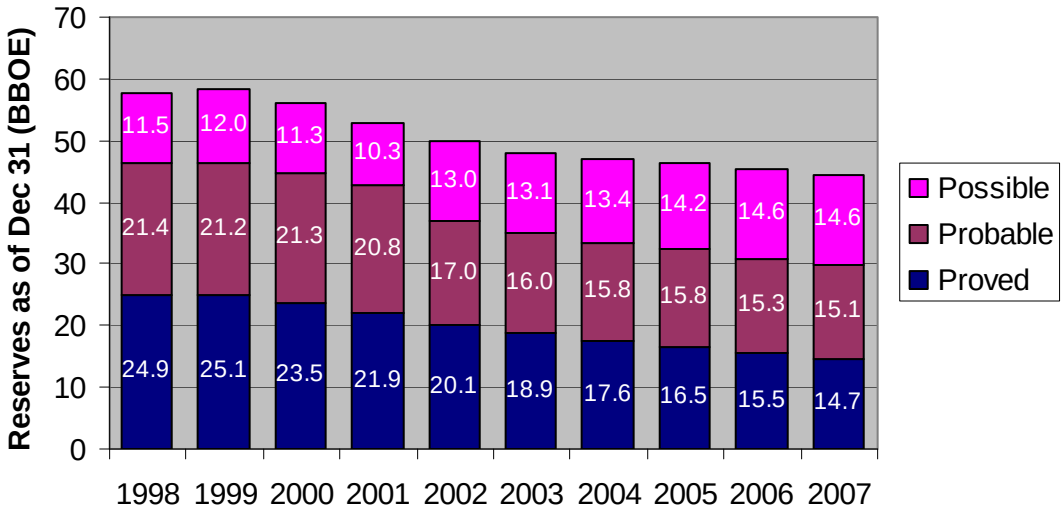


Figure 7: Proved (1P) Reserves Breakdown as of Dec 31, 2007
(Source: Pemex 2008)

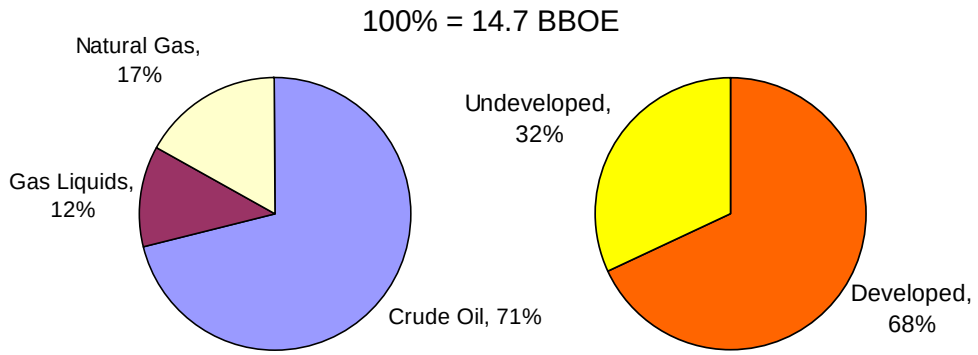
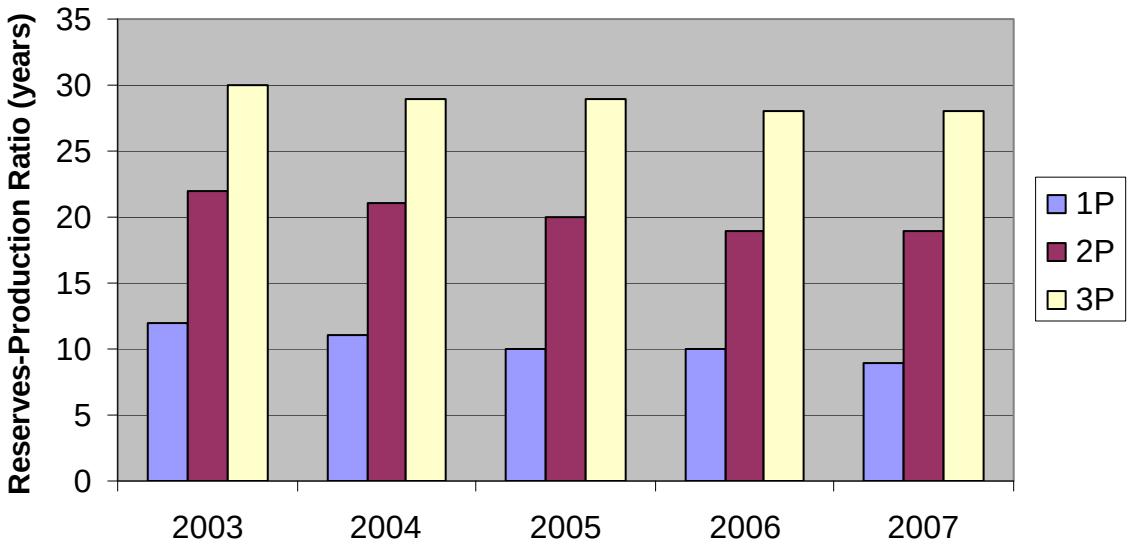


Figure 8: Reserves-Production Ratios Since 2003 (Source: Pemex 2008)



The rapid use of Mexico's proved reserves – of which only 68% are actually developed for production – is highlighted by the precipitous recent drop in production from Mexico's largest oil field (Figure 10b). Since its purely accidental discovery by a fisherman in 1976, the shallow-water Cantarell field in the Gulf of Mexico has accounted for a large majority of Pemex's oil production. It is also the world's second-largest oil producing field and the primary reason why Pemex has been able to transform itself into a major oil exporter. But Cantarell's production peaked in 2003-2004 when its average daily crude production of about 2 million barrels still represented 60% of Pemex's total production. With less than 6 billion proved barrels of crude oil equivalent remaining at Cantarell, Pemex officially predicted (in early 2005) production dropping to 29% below peak by 2008 (Figure 10a). In fact, Cantarell output seems to be tailing off more rapidly than forecast by Pemex; 2006 production from the field, expected by Pemex to stay near 2005 numbers, was actually about 10% below the previous year's output. (This was not a surprise to many outside observers who thought that even Pemex's somewhat grim estimates were overly optimistic, and who predicted that Cantarell's drop-off would be an even steeper "brick wall" that would seriously hamper Pemex's stated goals of holding production steady at around 3.4 million barrels per day for several years to come.[47])

47 See, e.g. G.R. Morton's compilation of reports on Cantarell's and Mexico's declining oil production, available at http://home.entouch.net/dmd/mexbrickwall.htm . Even an internal Pemex study – leaked to the press in December 2005 – included some pessimistic scenarios that had Cantarell's production dropping all the way to 875 thousand barrels a day by the end of 2007 and 520 thousand barrels a day by 2008. Pemex fought back at the ensuing news reports (without

But Pemex executives are quick to point out that the Cantarell drop-off did not catch them off guard. In fact, they proudly point to the fact that the Cantarell injection project's performance (described in section 2.5 above) actually exceeded performance expectations (PESD Interviews 2006-2007). However, the Cantarell came with a large opportunity cost, as Pemex's focus on boosting production from this well prevented investment in other producing fields, general infrastructure, and, perhaps most importantly, new exploration (which didn't really begin in earnest until late 2003). Between 1996 and 2001, a high proportion of scarce capital and managerial resources at Pemex were devoted to the Cantarell project as other investment opportunities were neglected or reduced. This only served to exacerbate Pemex's technological and human capital problems that stem from an even longer period of investment neglect.

Nevertheless, Pemex maintained a rosy outlook – at least publicly – on the reserves situation. During a conference call in March 2006, the company's CFO released a chart that forecast a drastic improvement in the reserves replacement rate between 2006 and 2010, with wholly a 77% proved reserves and 100% 3P reserves[48] by 2010. This vision was based on a planned capital expenditure on *exploration* for the same period of more than $12 billion[49] – a very large sum given that Pemex spent only around $300 million on exploration five years ago, which was ramped up to $2 billion by 2007. (Pemex 2008; PESD Interviews 2006-2007) Given the vast sums of money Pemex was already investing in production-related PIDIREGAS, this kind of commitment to exploration was certainly required.

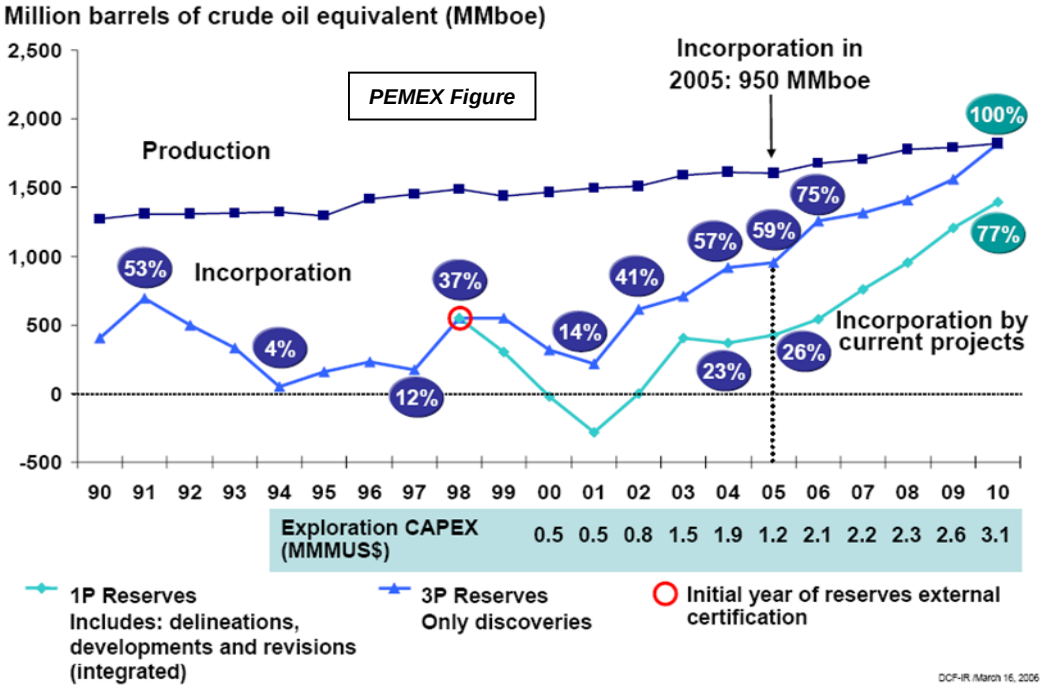
releasing the study) by stating that the study was actually meant at "avoiding . . a significant declining production scenario" by updating management on the important "short-term need[s] of taking complementary drilling actions and identifying production alternatives." In other words, the pessimistic scenarios would happen only if Pemex does not take the needed short-term actions it insists are, in fact, being undertaken.

48 It should be noted that "3P" reserves does not refer to proved reserves, but rather the sum proved, probable, and possible reserves. So even this optimistic projection does not say much about the *proved* reserves replacement.

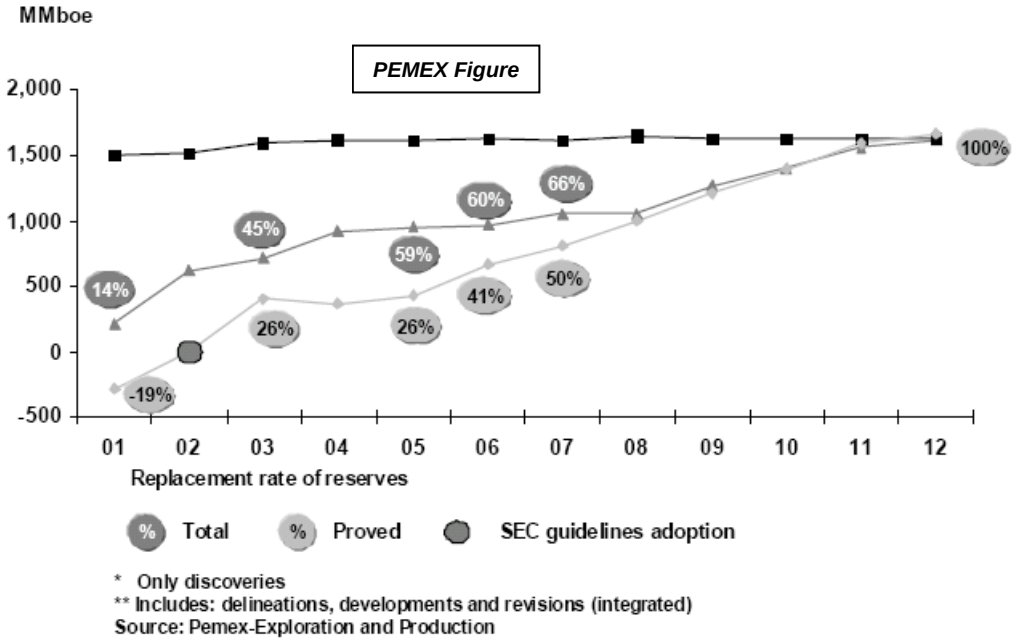
49 This figure – which represents 5-year capex for *exploration* only – should not be confused with Pemex's *overall* capex goals of $10 billion *annually*, the majority of it going into production.

Figure 9: Pemex Reserves Replacement Plans

(a) Pemex Reserves Replacement Plan as of March 16, 2006 (Source: direct from Pemex 2006)



(b) Pemex Reserves Replacement Plan as of March 26, 2008 (Source: direct from Pemex 2008)



Two years later, Pemex now forecasts a total (3P) reserves break-even point that has shifted out two years to 2012 – the comparison of the 2006 and 2008 projections is instructive (Figure 9). Just as

in the 2006 version, the 2008 forecast shows the reserves replacement trend line turning sharply upward soon out into the future. And yet actual performance for 2006 and 2007 has fallen significantly short of the original expectations as of early 2006, leading one to wonder if the same scenario will be repeated with respect to the new plan. The company claims it is confident that increasing exploration, combined with continuing improvements in production, will readily resolve any reserve worries. But since most new exploration activities will take place in deep waters[50] – an area that Pemex is just now getting into – any yields from this newly announced commitment to exploration probably will have little impact on reserves until 2012 at the earliest.

To make up for Cantarell's shortfall in the immediate future, the company is banking on increased production from other producing oil fields, something in which it has already invested over $40 billion between 2001 and 2005 (see Figure 10). In October 2006, the company announced a doubling in production from its Ku-Maloob-Zaap field over the next three years in a project that will cost it $6 billion. Pemex has also said that it will engage in other development activities that should result in "a significant reclassification of probable reserves to proved reserves." In early 2006 Pemex said that if all went well, it expected crude oil production for 2006 to surpass 3.4 million barrels per day, which would have made it a record high. But as mentioned above, all did not go well, as output from Cantarell had dropped by a full 10 percent in the first half of 2006, much more than expected. Still, the company's head of E&P restated confidence that Pemex could maintain a production platform between 3.1 and 3.3 million barrels per day. By the end of the year, Pemex's CEO had to tell the Senate Energy Committee that output at Cantarell was now expected to decline at an average rate of 14% a year between 2007 and 2015. But once again, company executives say that there is no cause for alarm in the company's ability to maintain overall production because other fields would offset Canterell's decline.[51] An E&P executive pointed out in mid-2007 that between 2004 and 2007, there was a 600 thousand barrel per day drop-off in Cantarell (a full 13% from peak), but overall Pemex crude production has dropped only 150 thousand barrels per day. Moreover, Pemex officials point out that once increasing natural gas production is accounted for, Pemex actually had a record production year in 2006 (PESD Interviews 2006-2007). Indeed, Pemex E&P has, to date, been able to make up for about 80% of the Cantarell drop through the development of Ku-Maloob-Zaap, numerous smaller fields in

50 During the hydrocarbon reserves conference call, Pemex officials said they expected 10 billion barrels of potential reserves to come from deep-water areas *where they are already drilling*. They also said the company is strengthening its portfolio by expanding investment beyond traditional areas where reserves are widely expected to lie to include "moderate and high-risk exploration activities."

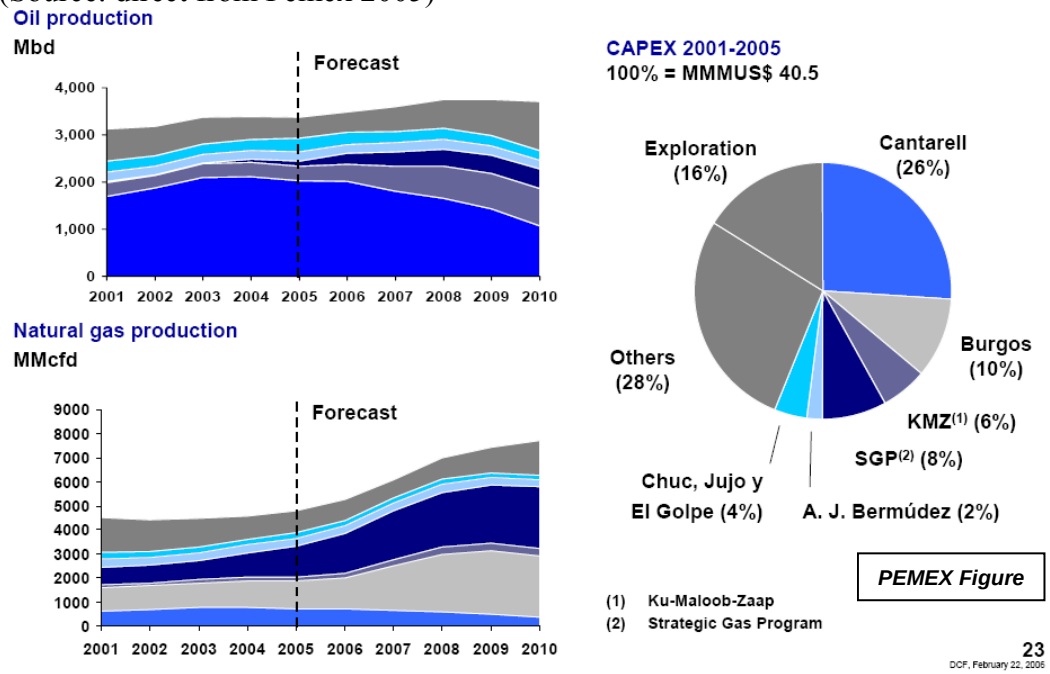
51 Although Pemex's leaders are more than happy to sound urgent alarm bells when it comes to the government's policies and fiscal dependence on their company.

the country's south region, and some new discoveries.

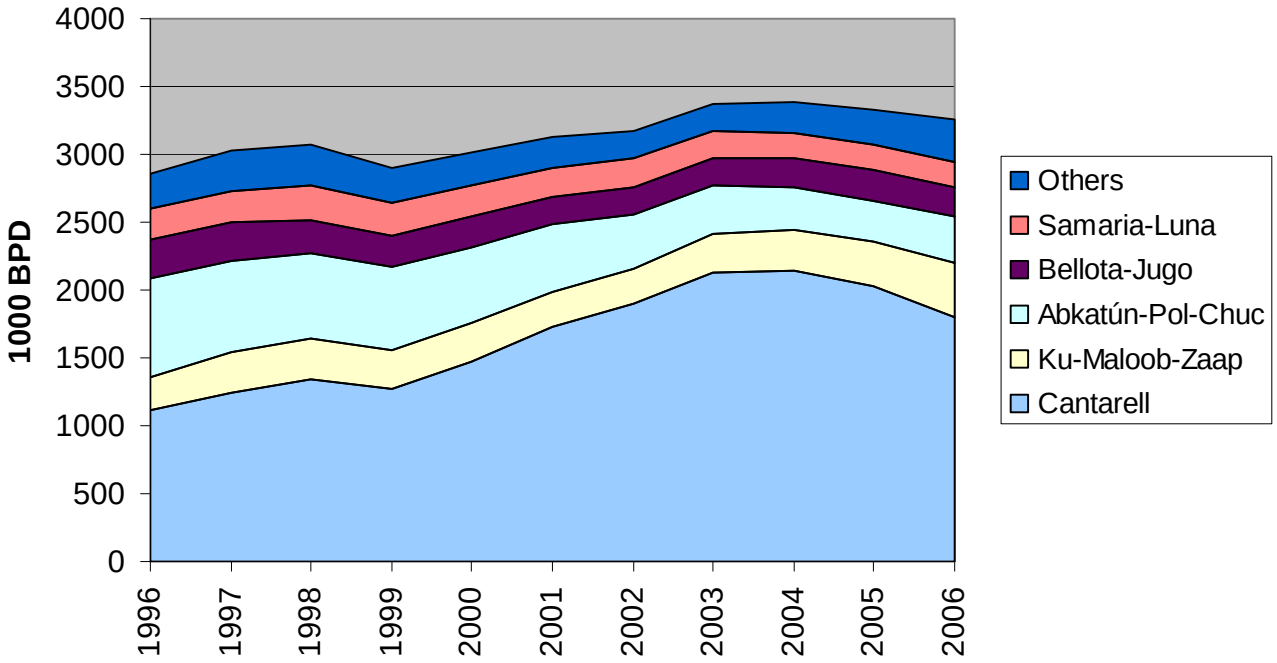
However, independent observers remain highly skeptical of Pemex's optimistic portrayal of a dangerous hydrocarbon reserves situation. Concern is that most of the important wells that Pemex says will make up for Cantarell's drop-off are also old and will have peaked by 2010 (see Figure 11). More specifically, there is concern that Pemex may be relying too much on the Ku-Maloob-Zaap field to make up for Cantarell (PESD Interviews 2006-2007). The oil from that field is mixed with lighter crudes because it is too heavy for refineries to process. The worry is that once Cantarell really declines, there won't be enough light crude production to mix with the oil coming from the heavier fields, which in turn would require substantial upgrading of the refineries to handle a fuller stream of heavy crude. Perhaps in order to address these concerns, leaders at Pemex E&P emphasize that they are also developing numerous small fields that are expected to increase production of lighter crudes in the near term.

Figure 10: Pemex 2005 Plans Compared with Actual Production

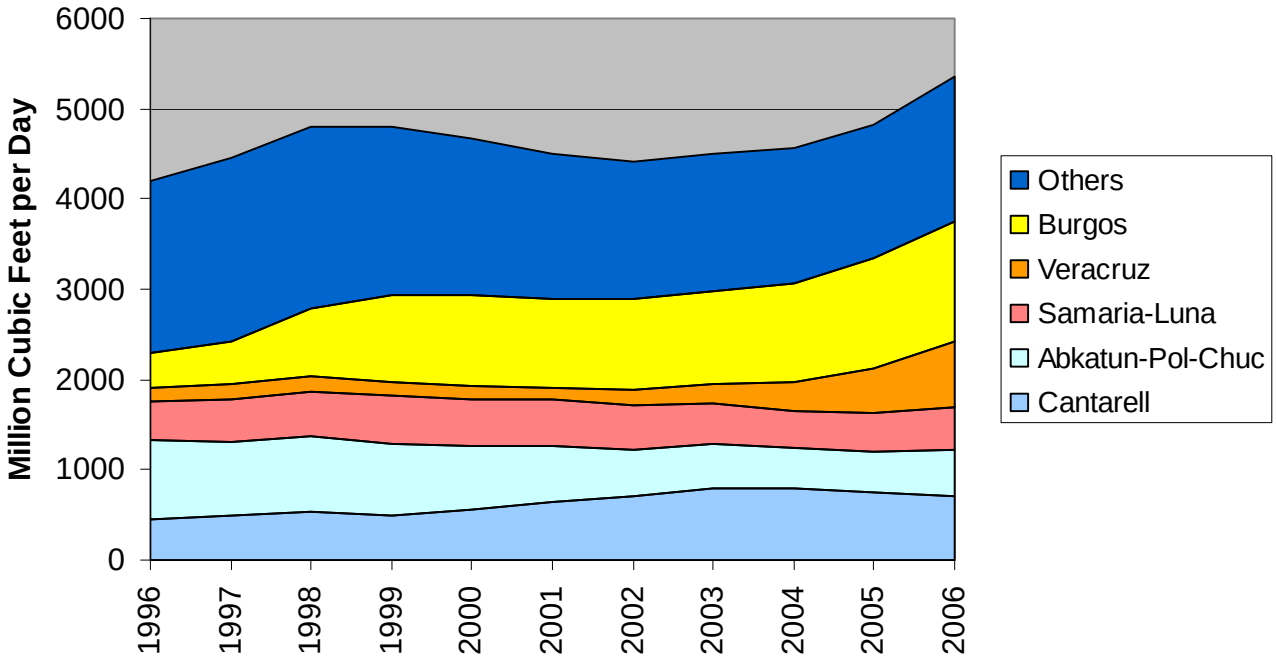
(a) Pemex Capital Expenditure and Production Forecasts for 2005 and Beyond (Source: direct from Pemex 2005)



(b) Actual Pemex Oil Production through 2006 (Source: Pemex Statistical Yearbook 2007)



(c) Actual Pemex Gas Production through 2006 (Source: Pemex Statistical Yearbook 2007)



It is also far from certain whether Chicontepec, another oil field often mentioned by both Pemex and outsiders as a possible savior to Mexico's reserves concerns, will ever become productive. Discovered three decades ago and located on shore, Chicontepec may contain crude reserves that dwarf Cantarell. However, this field is so geologically complex, that it will take a lot of capital, technology, and human expertise that Pemex lacks to bring up any oil from the ground.[52] Pemex is currently trying to negotiate a large service contract for technology transfer that will help it develop this field[53] (PESD Interviews 2006-2007). But it is doubtful whether developing Chicontepec will ever be worth the cost, and leaders of Pemex E&P admit that it is a great challenge. They may be wiser to instead look to deep water reserves, but as already mentioned, technological constraints also make that a longer-term solution to Pemex's reserves problem.

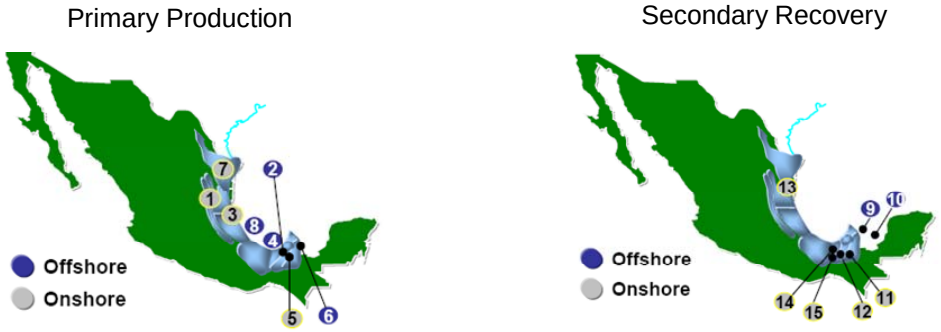
Another concern, pointed out by a banker during a company conference call, is that it is hard to

52 Chicontepec is believed to hold about 17.6 billion barrels of recoverable oil. But these are probable, not proved reserves, and the oil is extra heavy crude that requires special refining needs currently considered unviable in Mexico. A 2003 Pemex estimate said it could take total investments of $30 billion over 15 years to develop oil and gas reserves in Chicontepec - a project that would require drilling 13,500 wells.

53 A March 2006 announcement by former President Fox said that Pemex would invest $37.5 billion US dollars over the next 20 years on the oil fields of Chicontepec, with a goal of producing 1 million barrels per day. Pemex's CEO at the time estimated that 20,000 wells would be drilled in order to exploit the field.

believe that a reserve replacement rate of 77% can be achieved in just four years when for the better part of a decade record production levels have been pursued with only minimal new exploration, leaving replacement rates hovering around 20% or below. Pemex's CFO at the time replied that he was "very certain" of the existence of reserve volumes that will soon be reclassified as proved and because some investments (such as platforms, nitrogen injection capacity, etc...) have already been approved and contracted, leaving "very few" uncertainties in place.

Figure 11: Pemex Outlook for Reserves Development as of Feb 2005: Primary Production (#1-8) and Secondary recovery (#9-15) (Source: Pemex 2005)



Project	Oil Reserves (10^6BBL)	Gas Reserves (10^9CF)	Oil Peak Production Est Year	Oil Peak Production 1000BPD	Gas Peak Production Est Year	Gas Peak Production 10^6CFD
1) Amatitlán (Chicontepec)	1,740	2,338	2029	393	2029	439
2) Crudo Ligero Marino (SGP)	766	906	2007	230	2007	641
3) Agua Fría (Chicontepec)	357	637	2012	173	2012	191
4) Ayín-Alux	299	67	2014	74	2014	19
5) San Manuel (SGP)	214	1,084	2006	11	2006	214
6) Ixtal-Manik (SGP)	184	99	2008	55	2008	63
7) Burgos	98	3,006	-	-	2009	1,260
8) Cuenca de Veracruz (SGP)	-	1,043	-	-	2007	825
Secondary Recovery						
9) Cantarell	8,884	2,312	2006	1,996	2006	727
10) Ku-Maloob-Zaap	4,352	1,048	2010	794	2010	324
11) Antonio J. Bermúdez	2,207	2,495	2008	161	2008	282
12) Jujo-Tecominoacán	923	1,110	2008	88	2008	80
13) Poza Rica	670	791	2011	51	2011	56
14) Bellota Chinchorro	334	532	2008	53	2008	70
15) Cactus Sitio Grande	308	507	2010	27	2010	73

Almost no one seriously doubts the existence of vast untapped oil and gas reserves in Mexico. But given Pemex's difficult financial relationship with the government, its worrisome and ever-increasing debt leverage, and a potential drop in oil prices from current record highs, there is still a high degree of uncertainty for reserves investments over the next few years. All of Pemex's rosy projections are completely contingent on heavy investment in exploration and production. Relying on

the Mexican government to authorize such investments year in and year out and expecting Pemex to actually continue raising capital on world markets at favorable rates despite soaring debt is a big "if," to say the least.

But even if Pemex gets all the fiscal reforms and investment budgets it seeks, it will still have a tough time avoiding a hydrocarbon reserves crisis because the most critical constraint on Pemex these days is not only inadequate investment, but rather a lack of human capital. The company is not simply experiencing a drop in production, but rather a transition from a company that relied on one super giant field (Cantarell) to a company that now needs to manage a production portfolio of many fields. Pemex claims it is developing a portfolio with as many as 70 projects just to make up for Cantarell's shortfall (PESD Interviews 2006-2007). In addition, the company is now drilling around 700 wells per year (up from around 300 only a few years ago) so the number of field service contracts has multiplied. Such a transition is requiring Pemex to develop strong specialized skills and management capabilities that it currently lacks. Even with well-trained and motivated managers at its helm, Pemex may simply lack the capacity to manage so many large contracts in such a short period of time.

Executives admit that Pemex needs to improve its capacity to manage multiple projects and structure complicated contracts, particularly since the company outsources most of its E&P work. The Pemex strategy is to focus on learning from its prior experiences (PESD Interviews 2006-2007). For example, executives at E&P say that they are now transporting their experiences of managing a mature oil field that they learned from working with Cantarell over the past decade to other maturing fields that they hope to manage even better. In addition, they cite project administration and management of contracts as other key lessons learned during the 1996 Cantarell expansion. Managers feel, for example, that they now have a much better sense for the timing aspect of when to go out and contract for an oil platform. However, Pemex's plans leave little margin for error even while in the middle of this steep learning process. In order for its ambitious production and reserves replacement plans to succeed, almost all the projects the company undertakes will have to perform exactly as planned.

Overall, Pemex E&P managers feel that to successfully complete the transition there must be a change in culture to one where employees have the self-confidence to make decisions and explain their actions (PESD Interviews 2006-2007). They say that Pemex has already improved its management capabilities over the past decade. It has developed multi-functional project teams, consolidated the management of large fields, and overall the company has become a lot more open. Pemex now has non-commercial "technological agreements" with almost all the IOCs and some NOCs, which allows them to analyze information and share experiences. But company leaders also complain that their job is

made harder because the government does not understand this transition from a Cantarell-focused production scheme to a portfolio of many fields. They cite the paralyzing oversight from the SFP ministry as particularly problematic.

Pemex is also proud to highlight that like its financial reporting during the Fox administration, the company is quite transparent in its evaluation of reserves. Pemex no longer reports solely on in-house estimates as it has done for most of its history. Instead, it asks that these in-house estimates be certified by outside auditors and, if necessary, promptly restated. Since 1996, the company has also hired external consultants that specialize in hydrocarbon reserves to aid in the reserve calculations. In addition, the company adopted the United States SEC's definition for proved reserves and now conducts all reporting in accordance with these foreign regulations. As a result, many prior figures have had to be restated (e.g. the initial 2003 reported proved crude reserves of 16 billion barrels[54] has since changed to only 14.1 billion barrels at the time).

The move to the widely-understood SEC reporting standards for reserves was a welcome development in transparency, but it also marked an important stroke in the painting of a bleak reserves picture. Rather than providing support for management's formally optimistic projections, this level of transparency has revealed Mexico's troubled reserves situation to the entire world. This lends support to the theory that Pemex has shifted strategy and has embraced transparency to make it unacceptable for Congress to cut its funding. In November 2006, Pemex's outgoing CEO insisted that Pemex needed investments of $18 billion to $20 billion a year in exploration and production alone. The $14 billion invested in 2006 and $16 billion target for 2007 have already made the prior years' annual investments of around $10 billion pale in comparison.

5) Prospects for Reform

With a financial, hydrocarbon reserve, and technology crisis looming over Pemex, the company would seem to be ripe for major reforms. The reform bill just passed to the Senate on April 8, 2008 by President Calderón, with its proposals to increase Pemex autonomy (both financial and bureaucratic) and expand incentives for foreign participation in key areas of the hydrocarbons sector while staying within constitutional bounds, may represent at least a step in the right direction (Oxford Analytica 2008). Past experience warns that reforms might be significantly watered-down by the time they are

54 Source: BP Statistical Review of World Energy

implemented, and this bill has already attracted vociferous opposition from left-leaning lawmakers. The best hope is that the reform proposal is an important early move in a broad-based, sustained, and politically-skillful effort to remake Pemex and the Mexican hydrocarbons sector in a positive direction; time will tell.

There are essentially three different kinds of reforms that need to take place: fiscal, sectoral and oversight. (Encouragingly, all three types of needed reform are acknowledged to a greater or lesser degree in Calderón's bill.) Fiscal reform amounts to lowering the company's taxes, which would free up internal capex to be allocated by management, thus alleviating some of management's autonomy concerns as well as the debt problems. Sectoral reform, on the other hand, would be much broader and can address a host of issues from corporate governance to a constitutional opening up of the sector. Oversight reforms would change the way that government checks on Pemex's behavior—allowing the company to take more risk.

Looking forward, it is clear that proponents of any reforms will have to be extremely vigilant about separating their proposals from the issue of privatization, which lends itself to easy opposition given Mexico's negative experience with other privatizations. (Indeed, Calderon's reform bill proposes paying "bonuses" to foreign companies that find oil while scrupulously continuing to rule out the true equity partnerships that would be the most effective inducement to partnering.) Regarding fiscal reforms, there seems to be a general awareness among both the Mexican public and the political class that the country is facing a financial crisis and that continued tax reform is necessary. Most agree that the tax reforms agreed in 2006 and 2007 are only the beginning and that further fiscal reforms will happen one way or the other, even if very slowly.

Sectoral reform is likely to be even more difficult to achieve. It is hard to imagine how one could articulate a meaningful reform proposal without broaching the subject of greater private involvement in the sector. While conceptually very different, years of rhetoric make it almost certain that talks of opening up the sector will be followed by accusations of privatization.[55] Pemex's executives are well aware that to sell any reform ideas to the public, they will need to be clear that the reforms will address management, not ownership. In fact, Pemex's leaders tend to re-frame all talks reform in the language of corporate governance. As far as they are concerned, since the Mexican people (in theory, owners of the company) are unhappy with their management and the lack of

[55] It does not help, either, that the political left in the country wants to further integrate Pemex and tends to focus on jobs creation in the refining and petrochemicals subsidiaries – two of the companies biggest weaknesses, where private sector involvement would seem to help the most.

accountability, it is corporate governance that must be the first issue to be fixed before any other sectoral reforms take place.[56] This, they say, is why they are lobbying so hard for Pemex to have an independent board, strict reporting requirements, and otherwise implement "corporate best practices"[57].

Sectoral and oversight reforms are also not helped by the fact that Pemex (and the electricity companies) have cried wolf many times before. For example, electricity companies warned for several years that "the lights will go out by 2005" without any consequence. In addition, Pemex has a considerable historical track record of surviving despite the odds. One way or the other, no matter how bad things get, Pemex always seems to find ways to keep operating. Even from its earliest days, when Mexican oil was boycotted by the British and Americans, Pemex survived by selling petroleum to Nazi Germany. More recently, most experts and analysts predicted that the 1997 gas injection project for the Cantarell field would be a total failure and the first step in Pemex's collapse. But, in fact, the project worked largely according to Pemex expectations.

All indications are that there is a real reserves and technology crisis in Mexico and that patch-up reforms will not be enough to dodge yet another bullet. The Congress elected in 2006 will be in power for another 18 months, by which times reserves and debt levels are expected to be critical. Thus, it is this Congress, along with current president Felipe Calderón, that must be the ones to reform. For his part, Mr. Calderón has already said that he wants Pemex to form technology-sharing strategic alliances with foreign oil majors as well as allow for joint-production agreements with Pemex – these priorities are evident in his proposed new legislation. He is also more likely than former President Fox to challenge the powerful workers' union, though he is likely to take a slow approach to problems like the union as he first needs to build up momentum following the close elections. Mr. Calderón has also been very careful to say that he will not bring up – nor does he support – privatization of Pemex.

56 Interestingly, management does not exclude the possibility of privatization as one of the "further down the line" reforms after corporate governance. That kind of stance may make it difficult for them to maintain their short-term insistence to separate ownership from management reforms.

57 Ideally, top management would like an independent board that would be responsible for budgeting, procurement rules, nomination of the CEO, and "all the normal functions of a board."

SOURCES CITED

PESD Interviews 2006-2007 (in reverse chronological order)

- Carlos Morales Gil (Director, Pemex E&P) and Vinicio Suro Perez (VP, Planning and Evaluation, Pemex E&P), March 21, 2007, Mexico City.
- Rafael Alexandri Rionda (Ministry of Energy - SENER), March 21, 2007, Mexico City.
- Marco Alberto Oviedo Cruz (Director of Financial Planning of Ministry of Finance and Public Credit's Investor Relations office), March 21, 2007, Mexico City.
- Ismael Gomez Gordillo (private attorney; former Internal Controller, Pemex; former Undersecretary of Standards and Controls at Ministry of Public Functions – SPF), March 21, 2007, Mexico City.
- David Lunhow (Wall Street Journal reporter), March 20, 2007, Mexico City.
- John Padilla (consultant, IPD Latin America), Gonzalo Monroy (consultant, IPD Latin America), and Vania Laban (consultant, IPD Latin America), March 20, 2007, Mexico City.
- Pedro Aspe (CEO, Protego Asesores Financieros; Professor of Economics, ITAM, Mexico City; former Secretary of Finance and Public Credit, Mexico, 1988-1994), March 20, 2007, Mexico City.
- José Luis Aburto (President, Petrelec Energy Consultants) and Carlos Mena (Executive Director, MMC; former, SEMARNAT), March 20, 2007, Mexico City.
- José Luis Aburto (President, Petrelec Energy Consultants), March 20, 2007, Mexico City.
- José Luis Aburto (President, Petrelec Energy Consultants), January 24, 2007, Stanford, CA.
- Carlos Morales Gil (Director, Pemex E&P), Juan José Suárez Coppel (CFO, Pemex), Luis Macias Chapa (New Business Manager, Pemex), and Miguel Tame Domiguez (Director, Refining, Pemex), May 16, 2006, Mexico City.
- Elisabeth Malkin (*The New York Times* Mexico correspondent), May 16, 2006.
- Geri Smith (*Business Week* Latin America bureau chief), May 15, 2006, Mexico City.
- Rafael Diaz (Ministry of Finance and Public Credit; former Mexican Congressional aide), May 15, 2006, Mexico City.
- Jose Alberro (Consultant; former Director, Pemex Gas), March 9, 2006, Berkeley, CA.

Other Sources

Arai, Adriana, "Mexico Should Sell Some Pemex Units Carlos Slim Says", *Bloomberg*, August 30, 2005, (available at http://www.bloomberg.com/apps/news?pid=10000086&sid=ai7q0VtVP51o&refer=latin_america).
BP, *Statistical Review of World Energy 2007*.

Cárdenas, Cuauhtémoc, "The Future of U.S.–Mexico Relations," speech and interview at University of California Berkeley Center for Latin American Studies, March 2, 2006 (webcast available at http://socrates.berkeley.edu:7001/Events/spring2006/03-02-06-cardenas/index.html).

Carreón-Rodríguez, Victor G., Armando Jiménez, and Juan Rosellón, "The Mexican Electricity Sector: economic, legal and political issues" in *The Political Economy of Power Sector Reform: The Experiences of Five Major Developing Countries*, David Victor and Thomas C. Heller, eds., Cambridge: Cambridge University Press (2007), 175-214.

Cockrell, Cathy, "A conversation with Cuauhtémoc Cárdenas", *UC Berkeley News*, March 23, 2006 (available at http://www.berkeley.edu/news/berkeleyan/2006/03/23_cardenas.shtml).

Emmond, Kenneth, "Carlos Slim and Mexican poverty", September 12, 2005 (available at http://www.mexidata.info/id601.html).

Energy Intelligence, "Energy Intelligence Top 100: Ranking the World's Oil Companies", 2006.

Frontera Norte Sur, Mexicali & San Luis Rio Colorado News, 2006 (available at http://www.nmsu.edu/~frontera/Jan-Dec06/Mexicalinews.html)

Haber, Stephen, Noel Maurer, and Armando Razo, "When Institutions Don't Matter: The Rise and Decline of the Mexican Oil Industry", Working Paper

Malkin, Elisabeth, "Mexican President Haggles Over Pemex Reform", *The New York Times*, September 6, 2005.

Malkin, Elisabeth, "Leader of Mexican Energy Monopoly Resigns", *The New York Times*, November 2, 2004 (a).

Malkin, Elisabeth, "World Business Briefing Americas: Mexico: Pemex May Sell A Stake", *The New York Times*, November 4, 2004 (b).

McKinley, Jr., James C.. and Elisabeth Malkin, "Accidents Reveal Troubles At Mexico's Oil Monopoly", *The New York Times*, May 15, 2005.

Oxford Analytica, "Mexico's Calderón Attempts Oil Reform", in *Forbes.com*, April 11, 2008 (available at http://www.forbes.com/business/2008/04/10/mexico-oil-pemex-cx_0411oxford.html?feed=rss_business)

Pemex, company website, http://www.pemex.com, 2008 (includes documents from previous years).

Smith, Geri, "Pemex May Be Turning From Gusher To Black Hole", *BusinessWeek*, December 13, 2004 (available at http://www.businessweek.com/magazine/content/04_50/b3912084_mz058.htm).

Smith, Geri, "PEMEX: Still in the Dark Ages", *Business Week,* March 26, 2001.

Sosa-Garcia, Rodolfo, "The Historical Oil Rent in the Mexican Economy (1938-2001)" (paper available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=938268).

Victor, Nadejda, "On Measuring the Performance of National Oil Companies (NOCs)", *Program on Energy and Sustainable Development Working Paper #64*, September 2007 (available at http://pesd.stanford.edu/publications/nocperformance/)