



LAYING THE GROUNDWORK FOR THE STRENGTHENING OF PEMEX

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“Laying the Groundwork for the Strengthening of Pemex”

Introduction

As candidate and now as president of Mexico, Andrés Manuel López Obrador (AMLO) has vowed to strengthen Petróleos Mexicanos (Pemex). Since taking office on December 1, 2018, AMLO's policy decisions have made clear that Pemex will be the lead actor in the country's energy sector. The government's recently announced capital injections to Pemex¹ and the cancellation of oil and gas auctions,² the latter of which were the venue for companies to enter the Mexican upstream industry during the previous administration, are oriented to serve AMLO's goals for Pemex. However, AMLO's recent signals regarding future foreign direct investment in Mexico's upstream raise questions about the feasibility of reversing domestic production decline, particularly if it means a concerted joint effort involving Pemex and private firms will not be pursued.

Regardless of Pemex's influence on the domestic hydrocarbon industry, the situation in Mexico cannot be delinked from the dynamics of crude oil prices, investment flows, and production in the global arena. After all, Pemex profits from—and is affected by—its participation in international energy markets. In that vein, we analyze in this report important factors that shape the ability of oil and gas companies to weather market volatility and create value. We then consider the case of Pemex in this context, which is relevant given AMLO's stated goals. Indeed, a best case scenario would involve a healthy and thriving national oil company in Mexico that leads to strong development of the oil and gas industry and encourages the injection of capital and expertise from multiple private companies. All things considered, we posit that key industry practices followed by international oil and gas companies, if adequately implemented in Pemex, may complement López Obrador's energy plan to help recognize areas of opportunity for Pemex. Hence, the present discussion benefits greatly from corporate annual reports and filings that Pemex and its peer companies (BHP, BP, Chevron, Equinor, ExxonMobil, and Shell)³ submit to the U.S. Security and Exchange Commission.

Capital Budget and Debt

It is common practice for international oil and gas companies to formulate their capital budgets for exploration and production under various oil price assumptions,⁴ thereby ensuring that their portfolio is economically viable for different types of projects and production profiles. To make an investment decision, price is not the only determinant. For example, firms also consider the associated costs of expected technical and economic

¹ "El gobierno destinara 100,000 mdp más a Pemex. ¿Cuánto le ha dado hasta ahora?" *Expansión*, April 12, 2019, <https://expansion.mx/empresas/2019/04/12/el-gobierno-destinara-100-000-mdp-mas-a-pemex-cuanto-le-ha-dado-hasta-ahora>.

² "Mexico's new president takes nationalist tone on energy during first 100 days in office," *Houston Chronicle*, March 21, 2019, <https://www.houstonchronicle.com/business/article/Mexico-s-AMLO-takes-nationalist-tone-on-energy-13704506.php>.

³ Together, these companies are also referred to as "the majors."

⁴ To review historical oil prices, see U.S. Energy Information Administration (EIA), "Crude oil prices," https://www.eia.gov/dnav/pet/pet_pri_spt_sl_a.htm.

challenges, the existence or lack of infrastructure required to deliver produced volumes of crude oil and/or natural gas to market, and the time required to obtain the permitting needed for the projects in their portfolio.

Evidence indicates that the annual exploration and production budgets of peer companies are highly correlated to oil prices. This follows from the fact that most of the oil majors finance investments with their own financial resources and the projects must be projected to meet an internal required rate of return prior to execution. Among the peer companies considered, the highest exploration budget corresponds to ExxonMobil, with a yearly average of \$1.48 billion between 2000 and 2018, while BHP, which also has mining interests, has the lowest expenditure with an estimated yearly average of \$0.56 billion (Figure 1). Both cases illustrate the connection between crude prices and exploration expenditures. In this regard, Pemex contrasts starkly since high levels of taxation mean it must issue debt, usually in international markets, to finance investment and meet its own budget requirements as well as that of the government (Figure 2).

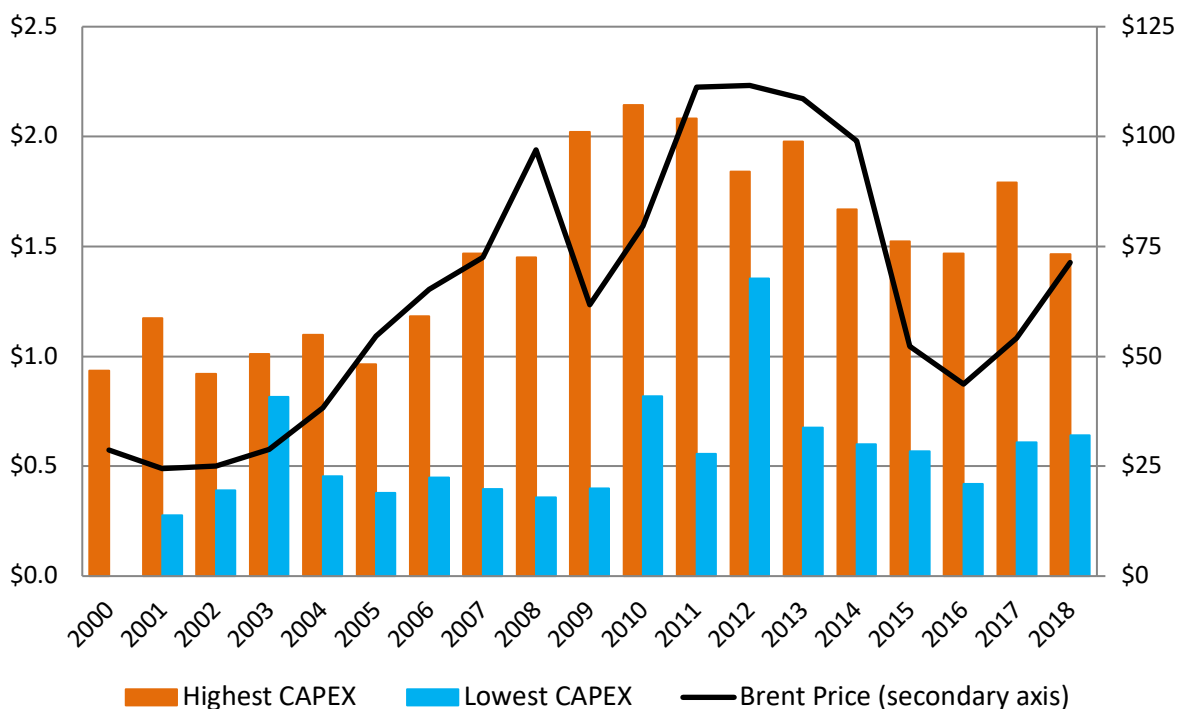
Pemex currently stands as the world's most indebted oil and gas company, and its ability to invest and generate sales has been shrinking. As a result, Pemex's debt increased from \$59.79 billion in 2012 to \$105.9 billion in 2018, while its net sales tumbled sharply from \$126.6 billion to \$85.41 billion over the same period.⁵ This adverse scenario is illustrated by the size of the maturing debt obligations Pemex will face between 2019 and 2021, which amounts to around \$25.5 billion.⁶ In this context, a business plan that is yet to be revealed and AMLO's decisions to ostensibly strengthen the company in the first months of his administration did little to avert a decision by rating agencies to downgrade Pemex debt, which has the unvirtuous result of further increasing borrowing costs.⁷

⁵ Petróleos Mexicanos, annual reports submitted to the U.S. Security Exchange Commission, Form 20-F, <http://www.pemex.com/en/investors/regulatory-filings/Paginas/sec-filings.aspx>.

⁶ Petróleos Mexicanos, investor presentation, February 15, 2019, http://www.pemex.com/en/investors/investor-tools/Presentaciones%20Archivos/Investor%20Presentation_February%202019.pdf.

⁷ "Mexico: Investment grade no more?" *Financial Times*, March 15, 2019, <https://ftalphaville.ft.com/2019/03/15/1552646413000/Mexico--Investment-grade-no-more-/>.

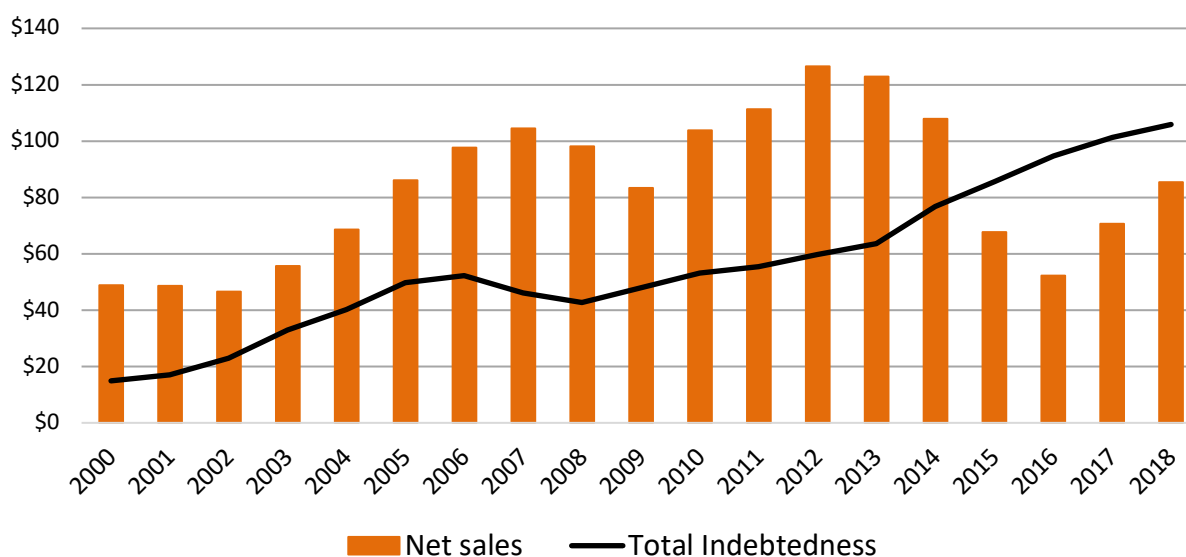
Figure 1. Range for majors' exploration expenses⁸ and Brent price⁹ (in U.S. billion dollars and U.S. dollars per barrel)



Note: Capital expenditures – CAPEX
 Source: Annual reports as submitted to the SEC

⁸ Annual reports of the majors, as submitted to the U.S. Security Exchange Commission.
 For Chevron, see <https://www.chevron.com/investors/financial-information>.
 For ExxonMobil, see <https://ir.exxonmobil.com/sec-filings>.
 For Equinor, see <https://www.equinor.com/en/investors/our-dividend/annual-reports-archive.html>.
 For Shell, see <https://www.shell.com/investors/financial-reporting/annual-publications/annual-reports-download-centre.html>.
 For BHP, see https://www.bhp.com/media-and-insights/reports-and-presentations?q0_r=category%3DAnnual%2BReports.
 For BP, see <https://www.bp.com/en/global/corporate/investors/results-and-reporting/annual-report/annual-reporting-archive.html>.
⁹ U.S. Energy Information Administration (EIA), “Crude oil prices,” https://www.eia.gov/dnav/pet/pet_pri_spt_sl_a.htm.

Figure 2. Pemex total indebtedness and net sales¹⁰ (in U.S. billion dollars)

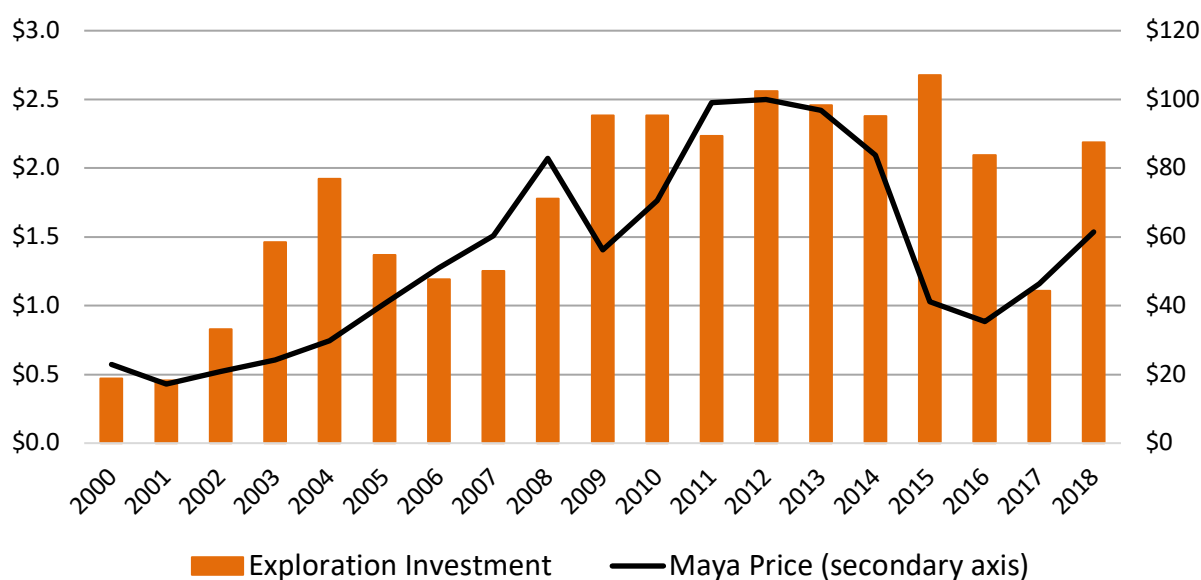


Source: Pemex annual reports submitted to the SEC

Before the energy reform, more precisely during the governments of Vicente Fox (2000-2006) and Felipe Calderón (2006-2012), the Pemex mandate was to maximize production volumes rather than value/profits. However, the plunge in crude prices between 2013 and 2017 changed this mandate since Pemex, like its peer companies, had to reduce its capital expenditures in a consistent manner. Considering that the yearly average price of Maya, Mexico’s oil price benchmark, dropped from \$96.89/b to \$46.41/b over that period, Pemex’s exploration expenditures declined from \$2.46 billion in 2013 to \$1.1 billion in 2017 (Figure 3). The downside of the price decline over this period is that Pemex debt skyrocketed in line with its own obligations and the financial requirements of the Mexican government, which continues to rely significantly on Pemex’s contributions.

¹⁰ Petróleos Mexicanos, annual reports submitted to the U.S. Security Exchange Commission, Form 20-F.

Figure 3. Pemex exploration investment¹¹ and Maya price¹² (in U.S. billion dollars and U.S. dollars per barrel)



Source: CNH and Pemex annual reports to the SEC

Portfolio Concept

Given price volatility, subsurface and above-ground risks, and the amount of capital required for exploration and production, oil and gas companies develop a portfolio of projects over time that will allow them to replace reserves, meet their production goals, and generate sufficient financial returns for shareholders. As a result, the portfolio tends to be diverse enough so that company's financial objectives are hedged against market volatility. Importantly, diversification manifests through activity in many different projects in multiple geographies and with partner investors, each of which is a classic approach to minimizing portfolio risk.

The portfolios of Pemex's peer companies include oil and gas projects from basins around the world—including onshore, shallow water, deepwater, conventional, and unconventional opportunities. In addition, in order to diversify risk across multiple assets, all of which are generally very expensive, companies very seldom take 100% ownership in a project; rather, companies share risks and costs with other firms and take advantage of the technical knowledge and synergies that potential partners may bring to a project. In this manner, the companies' portfolios are diversified by project type, project financial

¹¹ Mexico's National Hydrocarbons Commission (CNH), Commissioner Alma America Porres Luna, PowerPoint presentation to members of the Chamber of Deputies, March 13, 2019.

¹² Petróleos Mexicanos, annual reports submitted to the U.S. Security Exchange Commission, Form 20-F.

commitment, and geography. For example, in its 2018 annual report, ExxonMobil published a list of 27 conventional and unconventional oil projects in onshore, deepwater, and shallow water environments across the globe that started between 2013 and 2018. The company held a 100% stake in only three of these projects while in all the others it had a working interest ranging from 9% to 62%.¹³

Pemex, in contrast, due largely to its domestically oriented mandate, has not developed a diversified portfolio. Instead, it has continued to pour expenditures into the Cantarell and Ku Maloob Zaap oil fields to arrest the production decline. In general, as fields mature, maintaining production at previous levels becomes more costly, which is why we see production facilities ultimately reach economic exhaustion—they simply become more and more expensive, thus requiring greater and greater expenditures to remain in production. This ultimately results in facility retirement. For Pemex, the emphasis on production from existing assets results in larger expenditures per unit of production, which leads to greater debt, particularly when current revenues are not able to be redeployed for portfolio expansion and diversification.

The point to highlight is that the opening of the oil and gas sector by the Peña Nieto administration provided Pemex with the opportunity to expand its project portfolio. The so-called Round 0 in 2014 was a step in that direction. Pemex was awarded 100% of the reserves it requested (20,589 million barrels of oil equivalent [MMBOE] or 83% of Mexico's total 2P reserves) as well as 68% of the prospective resources it demanded (23,447 MMBOE, which are equivalent to 21% of Mexico's total prospective resources).¹⁴ These assignments were made previous to the bid rounds that offered blocks to both private firms and Pemex. After Round 0, Pemex took part in the bid rounds and secured 14 contracts—11 as part of a consortium with international oil and gas firms and three by itself. Of the contracts Pemex secured, nine are in shallow waters outside of Cantarell and Ku Maloob Zaap, and five are in deepwater areas where Pemex has 100% ownership in two of the five. Only one of these contracts is primarily a natural gas play. Pemex has also been awarded three farmouts.¹⁵

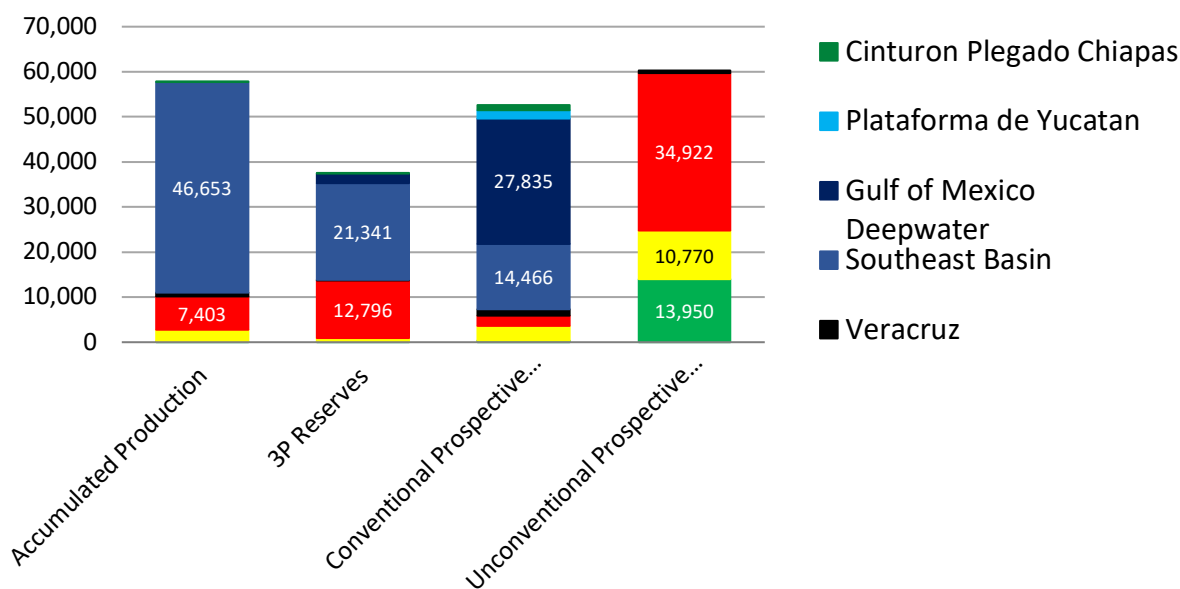
Pemex's ability to secure contracts on its own and as part of consortiums in past bidding rounds sheds light on the fact that, regardless of all the challenges, private companies are keen to team with Pemex and share the risk of projects. Down the road, this is a reality that AMLO's government may consider if the president decides to tap into, for example, the 27,835 MMBOE the country is estimated to hold in prospective resources in the deepwater basins of the Gulf of Mexico, or the 60,205 MMBOE of prospective unconventional resources primarily in the Tampico-Misantla, Burgos, and Sabinas-Burro-Picachos basins (Figure 4).

¹³ ExxonMobil, 2018 filing to the Security Exchange Commission, <https://ir.exxonmobil.com/sec-filings>.

¹⁴ Secretaria de Energía (SENER), Ronda Cero y migración de contratos de Pemex, December 17, 2015, <https://bit.ly/2u2SORL>.

¹⁵ Mexico's National Hydrocarbon Commission (CNH), Rondas, <https://rondasmexico.gob.mx/esp/rondas/>.

Figure 4. Pemex’s accumulated production, reserves, and prospective resources to January 2015¹⁶ (in millions of barrels of crude oil equivalent)



Source: National Hydrocarbons Commission (CNH) with data from the Secretariat of Energy (SENER)

López Obrador has hinted that the future of Pemex, at least through his term, will be in shallow waters and onshore areas, which limits prospective developments to an estimated 37,405 MMBOE of 3P reserves. This policy-oriented constraint reduces the probability that Pemex will be able to reverse its production decline because it effectively eliminates access to potential volume and revenue gains that may result from developing deepwater and unconventional reserves in the future, be it alone or in a consortium. If considered in the global context of competitive, risk-averse approaches to upstream development, a broader perspective on domestic resource development opportunities would be considered with a risk-sharing, joint venture approach to development across the multiple opportunities in Mexico. This approach would apply to all long-term projects—onshore, shallow water, and deepwater—that comprise the 3P reserve estimates in Figure 4 and the 112,864 MMBOE in prospective resources in Mexico. Such a diversified risk-sharing approach would be a precursor to attracting much-needed investment and set the stage for Mexico to achieve greater energy security and self-sufficiency.¹⁷

To achieve such an end, the participation of oil and gas companies with experience in shale and deepwater projects would be valuable, and could be facilitated by Pemex in partnership with private operators, companies that already have been awarded contracts,

¹⁶ Mexico’s National Hydrocarbons Commission (CNH), Commissioner Alma America Porres Luna, PowerPoint presentation to members of the Chamber of Deputies, March 13, 2019.

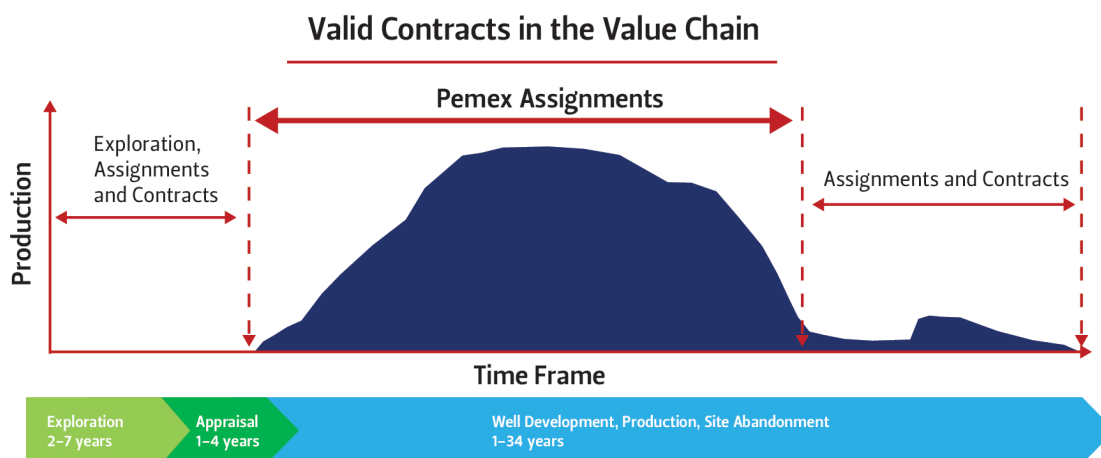
¹⁷ The argument also refers to crude by-products and natural gas.

and new contracts the government may offer in future bid rounds. In this regard, it is worth noting that a calendar of the schedule of future bid rounds is important since it helps various market participants plan their involvement and dedicate financial resources to the process, especially given that the international capital market is competitive.

The Time Line of a Production Venture

As indicated in Figure 5, the generic representation of a potential project has the following phases: exploration, appraisal, development, and production. The time and financial resources required for each of these phases are a function of the complexity of the project, whether new technology is needed to make it possible, the availability of infrastructure and supply chains, and above-ground risk. Full cycle is defined as the time it takes from initiation of a project through full development. Phases of development include initial data collection and interpretation, leasing or acquisition of rights to explore, initial “proof of concept,” exploratory drilling (confirmation, appraisal, etc.) and reservoir assessment, engineering and design of full field development and economic analysis, final investment decision, commencement of full field development including drilling production wells, and, finally, abandonment and reclamation. In some cases, onshore firms can “buy a deal” and if this deal is already leased and ready to drill (“drill ready”), the time from capital outlay to production for the buyer is reduced. However, it is important to note that the amount of time from project conceptualization to execution is not actually accelerated because the original owner had to invest time and money to advance the project to the stage where its ownership was transferred. Hence, Figure 5 is relevant for describing the time required for field development, not the time for a single owner to realize production, particularly because the owner can enter the process later in the field development time line.

Figure 5. Generic Exploration and Production Profile¹⁸



Source: CNH

¹⁸ Mexico’s National Hydrocarbons Commission (CNH), Commissioner Alma America Porres Luna, PowerPoint presentation to members of the Chamber of Deputies, March 13, 2019.

Figure 5 is a generic representation, as the timing of a project can vary and be specific to a given project. But there are two aspects of project development that can generally drive up the amount of time required for project execution: testing and infrastructure. Testing is sometimes referred to as “proof of concept.” For instance, after a prospect concept is deemed worthy of new investment, time and money is spent collecting additional data to confirm or reject the validity of the concept. This often involves drilling new wells, collecting cores, perforating for fluid sampling, testing flow rates and pressures, assessing stimulation design, landing zone detailing, etc. The same is true for infrastructure assessment, siting, and development, which involve determining the source and/or adequacy of power, pipelines, gas processing, fresh or brackish water supplies, saltwater disposal-treatment, etc., and, if offshore, construction and installation of a producing structure and subsea units. All of these aspects of any new project require extensive study and permitting in order for a project to be executed in the most economically, technically, and environmentally feasible manner.

The time from initial investment to drilling an exploratory well onshore is typically one to three years. Once a discovery is made (defined as oil and/or gas flowing to surface), confirmation wells are often drilled. In some cases, drilling and completion designs may be modified; in other cases, confirmation wells are drilled to determine the size of the field and to refine the evaluation of the estimated ultimate recovery (EUR) of oil and gas from the field. The confirmation phase generally takes one to three years to work through, as significant amounts of new data are collected and must be compared to and reconciled with original project designs and projections. Changes are inevitable, and it can take additional time to make adjustments that may be necessary to keep the project on track. If the project survives (and hopefully, thrives), it is ready for full development assuming the necessary infrastructure (mentioned above) has sufficiently progressed on a parallel track. Given the complexities that can arise, it can take anywhere from two to six years for an onshore prospect (conventional or unconventional) to produce the first barrel of oil. By contrast, it can take anywhere from eight to twelve years for generally much more technically challenging and capital intensive deepwater projects to produce the first barrel of oil.¹⁹

Time for full development depends on the size of the project and the operating environment (for example, onshore versus offshore), but costs and technology also play a significant role. For example, the cost of capital required to execute projects is affected by debt-equity ratios and interest rates, among other things. So the ability to self-finance (equity invest) can lower the cost of entry and reduce the time to execution, all else equal. These matters are all relevant when assessing viable partners as well as the contractual terms of project development.

In a nutshell, exploration and production activities can take significant time to execute and can be influenced by a variety of factors. Mexico hosted its first oil and gas auction in July 2015, awarding two shallow water contracts to private firms for the first time in almost eight decades. For the upstream industry, four years is not generally sufficient to bring an

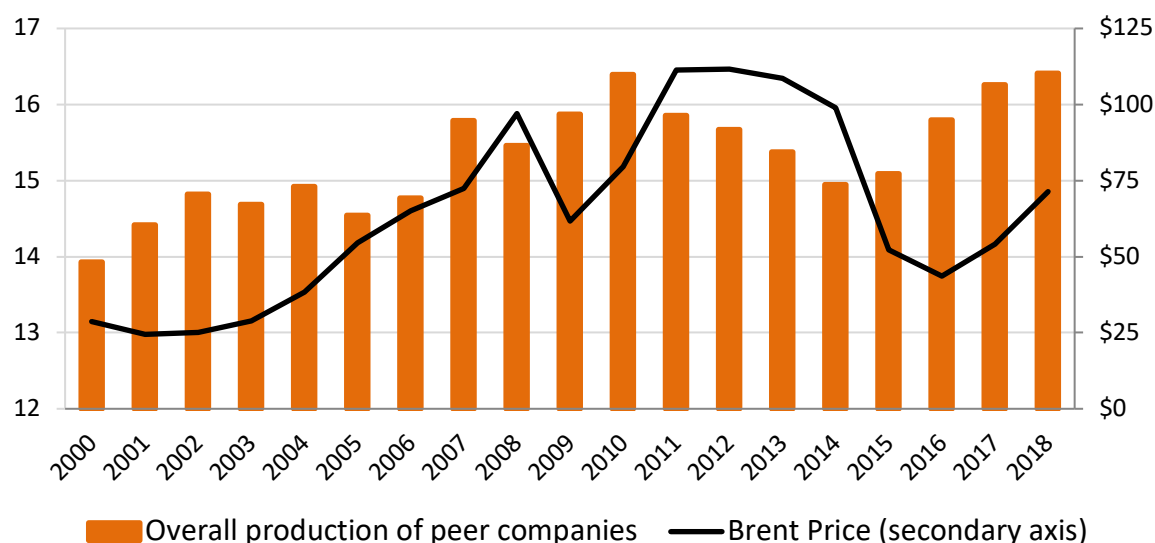
¹⁹ Ibid.

area from the exploration phase to full-field development and production. This alone can help explain why contracts awarded in past auctions have not yet led to significant production. Hence, while it may be rational to create incentives to accelerate development in awarded blocks, it is also prudent to fully understand the various challenges that each production venture faces in moving from conceptualization to execution. Doing so can help create an environment where operators and the government can work together more smoothly to achieve the stated goal of strengthening Mexico’s upstream sector, with Pemex at the core of the movement.

Production Volumes and Reserves Replacement

A correctly constructed portfolio will render a company’s profit and losses (P&L) less sensitive, although not immune, to fluctuations in oil prices (Figure 6). Firms will attempt to increase production as oil prices rise, but sustaining ever higher production volumes is untenable if all market participants are reacting similarly, particularly if supply outpaces demand. However, the majors’ production volumes are heavily influenced by their portfolio economics and the ability to diversify production and investment in such a way that minimizes costs and maximizes capital efficiency. Indeed, a long-term view on price helps to maintain capital discipline and operational efficiencies that can actually facilitate production growth in low price periods, which is evident in Figure 6.

Figure 6. Production of peer companies²⁰ and Brent price²¹ (MMBE/d and U.S. dollars per barrel)



Source: Annual reports of companies submitted to the SEC and U.S. EIA

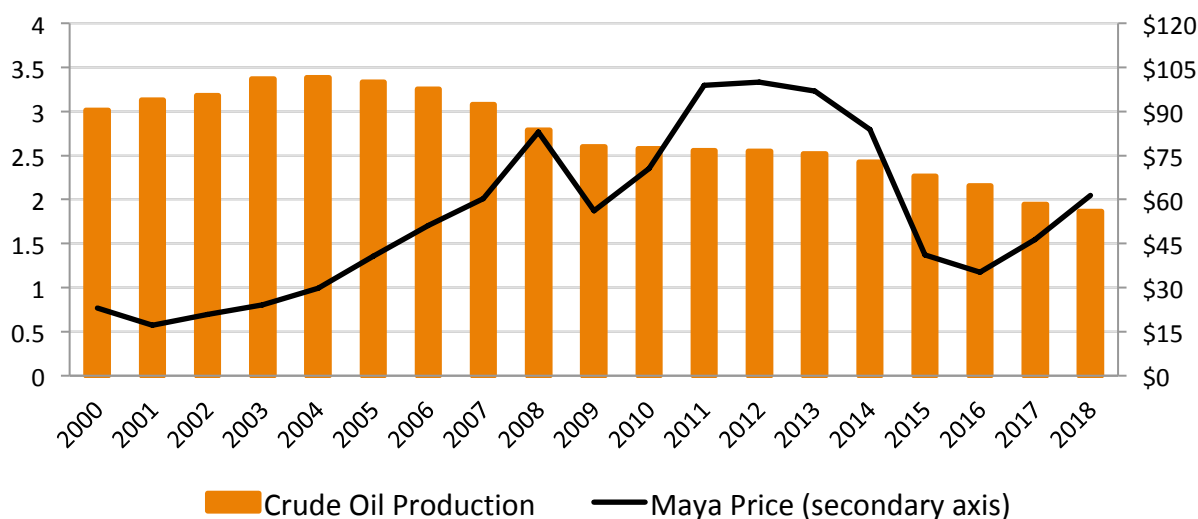
²⁰ Annual reports of major oil companies submitted to the SEC.

²¹ U.S. Energy Information Administration (EIA), “Crude oil prices.”

Despite the fact that Pemex’s peer companies adjust their budgets in accordance with oil price movements, they continue to seek exploration and development opportunities regardless of the current price environment. In fact, their diversified portfolio approach allows them to continually pursue development opportunities, including participation in bid rounds, that are internationally competitive. Moreover, the portfolio approach to investment makes Pemex’s peer companies willing to share risk, capital depth, technical and operational expertise, and project execution knowledge. Such an approach is actually in their interest as they seek to replace reserves and meet shareholders commitments.

Pemex’s production has consistently declined since 2004 despite historically high oil prices during this period (Figure 7); this stands in stark contrast to the experience of peer companies, as indicated in Figure 6. One fundamental difference is that Pemex has been unable to emphasize exploration activities, which in the long run sustain production levels and reserve replacement. A heavy tax burden and growing debt (Figure 2) have taken a toll on Pemex’s financial capacity to invest in what’s needed to ensure its future success. To be clear, the oil and gas industry is characterized by production of a depletable resource, so reserve replacement is paramount. In fact, if a firm is not re-investing in its core asset, exploring or acquiring proven reserves, it will eventually cease to exist. The reality that Pemex currently faces—high debt and declining production—highlights a need for significant capital infusion, which foreign firms have demonstrated a willingness to provide. Thus, Pemex can accelerate a recovery with a prudent plan that encourages international capital inflows into Mexico’s upstream sector.

Figure 7. Pemex crude oil production and Maya price²² (MMBO/d and U.S. dollars per barrel)



Source: Pemex annual reports submitted to the SEC

²² Petróleos Mexicanos, annual reports submitted to the U.S. Security Exchange Commission, Form 20-F.

Conclusion

Based on the discussion presented herein, a policy-motivated focus on the lack of production from recent deepwater exploration contracts awarded to private companies must be in line with realistic expectations. Given the length of time needed to fully execute a commercial production prospect (from exploration to delivery of oil and/or gas to market), most contracts awarded in the past four years cannot reasonably be expected to have delivered any appreciable results yet, especially deepwater prospects or, more generally, greenfield prospects. That stated, it is reasonable to construct project time lines that can be reviewed for reasonable progress as long as regulatory/contractual impediments are recognized.

Strengthening Pemex requires developing a robust portfolio of projects as well as significant capital injections. Partnerships with private companies could facilitate this process. Pemex does not need to allocate funds for 100% of projects nor does it need to bear 100% of the project risk. Pemex could effectively diversify its portfolio by participating in multiple projects with different partners, benefitting from technology transfer and having a more efficient capital allocation. A diversified portfolio would allow Pemex to be better prepared to hedge oil price volatility like its peers. The recent downgrade of Pemex debt renders access to capital more expensive and difficult, while private companies that are willing to join as partners in farmouts, participate in bid rounds, and/or take equity interest in projects can reduce the cost of entry for Pemex and ultimately increase Mexico's production and proved reserves.

Appendix

Pemex data used for Figure 4 in MMBOE

Area	Accumulated Production		Reserves			Prospective Resources	
	Volume	%	1P	2P	3P	Conventional	Unconventional
Sabinas-Burro-Picachos	125		11	29	62	395	13,950
Burgos	2,630	5	208	513	797	3,204	10,770
Tampico-Misantla	7,403	13	1,036	6,145	12,796	2,347	34,922
Veracruz	849	1	166	206	249	1,432	563
Southeast Basin	46,653	81	11,405	15,625	21,341	14,466	
Gulf of Mexico Deepwater			94	464	2,158	27,835	
Plataforma de Yucatan						1,778	
Cinturon Plegado Chiapas	22		1	2	2	1,172	
Cinturón Plegado de la Sierra						30	
Madre Oriental							
TOTAL	57,682	100%	13,017	22,984	37,405	52,659	60,205

Laying the Groundwork for the Strengthening of Pemex

Proved reserves, production, and exploration expenses for selected companies, 2000-2018²³

	Equinor			BHP			BP		
	Proved reserves MMBOE	Production MBOE/D	Exploration expenses US\$ b	Proved reserves MMBOE	Production MBOE/D	Exploration expenses US\$ b	Proved reserves MMBOE	Production MBOE/D	Exploration expenses US\$ b
2000	4,317	1,005	278	1,388	—	155	14,500	3,240	599
2001	4,277	1,007	320	1,408	0.370	165	16,300	3,414	238
2002	4,267	1,074	275	1,456	0.367	152	17,263	3,519	385
2003	4,264	1,080	263	1,503	0.334	154	18,338	3,606	542
2004	4,289	1,106	271	1,420	0.336	181	18,583	3,997	637
2005	4,295	1,169	359	1,406	0.326	202	17,893	4,014	684
2006	6,101	1,778	1,661	1,362	0.322	393	17,700	3,926	1,045
2007	6,010	1,839	1,260	1,353	0.318	334	17,814	3,818	756
2008	5,584	1,925	2,608	1,375	0.355	359	18,147	3,838	882
2009	5,408	1,962	1,856	1,381	0.378	400	18,292	3,998	1,116
2010	5,325	1,888	2,614	1,394	0.434	637	18,071	3,822	843
2011	5,426	1,850	1,534	1,834	0.437	559	17,748	3,454	1,520
2012	5,422	2,004	3,111	2,559	0.609	735	17,000	3,331	1,475
2013	5,600	1,940	2,001	2,564	0.646	675	17,996	3,230	3,441
2014	5,359	1,927	4,812	2,442	0.674	600	17,523	3,151	3,632
2015	5,060	1,971	3,446	1,908	0.701	567	17,180	3,277	2,353
2016	5,013	1,978	2,952	1,303	0.658	296	17,810	3,268	1,721
2017	5,367	2,080	1,059	1,535	0.571	480	18,441	3,595	2,080
2018	6,175	2,111	1,405	1,400	0.527	549	19,945	3,683	1,445

	Exxon			Chevron			Shell		
	Proved reserves MMBOE	Production MBOE/D	Exploration expenses US\$ b	Proved reserves MMBOE	Production MBOE/D	Exploration expenses US\$ b	Proved reserves MMBOE	Production MBOE/D	Exploration expenses US\$ b
2000	20,915	4,277	936	11,499	—	949	14,701	3,638	
2001	21,002	4,255	1,175	11,759	2,522	1,039	13,770	3,724	885
2002	21,304	4,238	920	11,890	2,626	591	13,721	3,938	997
2003	21,000	4,203	1,010	11,964	2,523	571	12,980	3,837	1,059
2004	22,000	4,215	1,098	11,252	2,509	697	11,882	3,670	651
2005	22,400	4,065	964	11,905	2,517	743	11,466	3,403	815
2006	22,700	4,237	1,181	11,620	2,667	1,364	11,466	3,473	949
2007	22,700	4,180	1,469	10,777	2,619	1,323	11,954	3,315	1,115
2008	23,092	3,921	1,451	11,196	2,530	1,169	10,903	3,248	1,447
2009	22,985	3,932	2,021	11,315	2,704	1,342	14,132	3,142	1,186
2010	24,809	4,447	2,144	10,545	2,763	1,147	14,249	3,314	1,214
2011	24,932	4,506	2,081	11,236	2,673	1,216	14,250	3,215	1,462
2012	25,164	4,239	1,840	11,347	2,610	1,728	13,556	3,262	2,114
2013	25,216	4,175	1,976	11,203	2,597	1,861	13,944	3,199	2,506
2014	25,269	3,969	1,669	11,101	2,571	1,985	13,081	3,080	2,244
2015	24,759	4,097	1,523	11,168	2,622	3,340	11,747	2,954	2,948
2016	19,974	4,053	1,467	11,121	2,594	1,033	13,248	3,668	1,274
2017	21,221	3,985	1,790	11,664	2,728	864	12,233	3,664	1,048
2018	24,293	3,833	1,466	12,052	2,930	1,210	11,578	3,666	889

²³ For Pemex reserves, see National Hydrocarbons Commission (CNH), Reservas de hidrocarburos IP en millones de barriles de petróleo crudo equivalente, <https://reservas.hidrocarburos.gob.mx/>. For Pemex production in MBOE, see National Hydrocarbons Commission (CNH), Oil and Gas Production Board, <https://produccion.hidrocarburos.gob.mx/>. For the remainder of oil companies identified in this report, see their annual reports submitted to the U.S. Securities and Exchange Commission.

Laying the Groundwork for the Strengthening of Pemex

	Pemex		
	Proved reserves MMBOE	Production MBOE/D	Exploration expenses US\$ b
2000	34,104	3,791	0.471
2001	32,614	3,879	0.458
2002	30,837	3,913	0.829
2003	20,077	4,120	1.461
2004	18,895	4,145	1.923
2005	17,650	4,136	1.368
2006	16,470	4,148	1.192
2007	15,514	4,085	1.254
2008	14,717	3,944	1.779
2009	14,308	3,773	2.384
2010	13,992	3,747	2.385
2011	13,796	3,651	2.232
2012	13,811	3,611	2.558
2013	13,867	3,584	2.457
2014	13,437	3,518	2.378
2015	13,017	3,334	2.675
2016	10,243	3,123	2.094
2017	9,161	2,801	1.106
2018	8,484	2,614	2.188

Source: Companies' annual reports and Mexico's CNH

Crude oil prices, 2000-2018²⁴ (in U.S. dollars)

	Maya	Brent	WTI
2000	22.99	28.66	30.38
2001	17.19	24.46	25.98
2002	20.89	24.99	26.18
2003	24.13	28.85	31.08
2004	29.82	38.26	41.51
2005	40.61	54.57	56.64
2006	51.10	65.16	66.05
2007	60.38	72.44	72.34
2008	82.92	96.94	99.67
2009	56.22	61.74	61.95
2010	70.65	79.61	79.48
2011	98.97	111.26	94.88
2012	99.98	111.63	94.05
2013	96.89	108.56	97.98
2014	83.75	98.97	93.17
2015	41.12	52.32	48.66
2016	35.30	43.64	43.29
2017	46.41	54.13	50.80
2018	61.74	71.34	65.23

Source: EIA and Pemex

²⁴ For WTI and Brent, see U.S. Energy Information Administration (EIA), "Crude oil prices," https://www.eia.gov/dnav/pet/pet_pri_spt_sl_a.htm. For Maya, see: Petróleos Mexicanos, annual reports submitted to the U.S. Security Exchange Commission, Form 20-F.