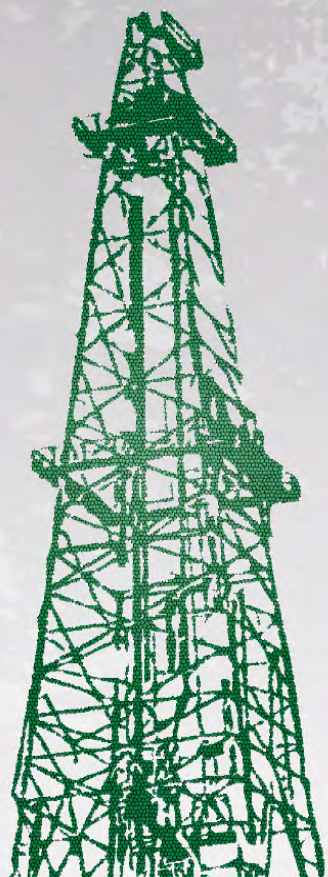
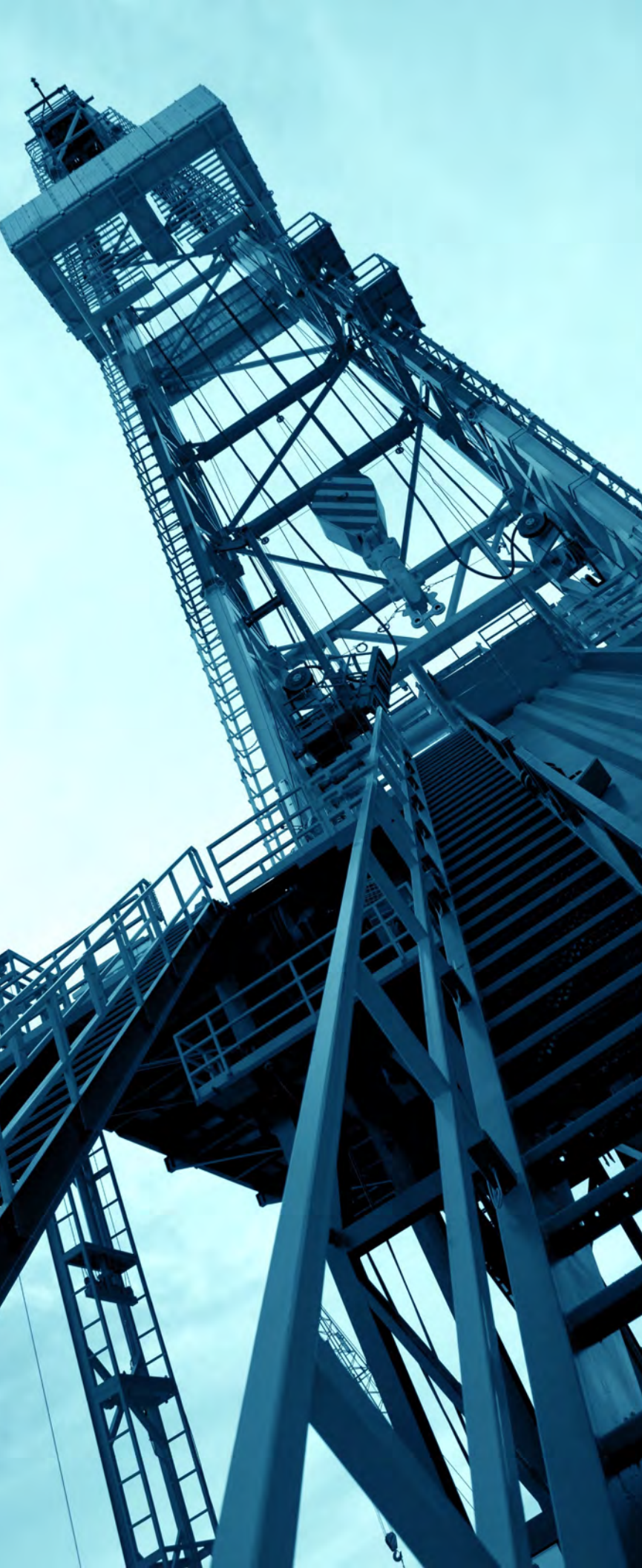


Economic Impact and Legal Analysis
of the Shale Oil and Gas Activities in

Mexico

Preliminary Report





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May 2015

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This report was prepared by the University of Texas at San Antonio (UTSA), the Asociación de Empresarios Mexicanos (AEM), the Universidad Autónoma de Nuevo León, Faculty of Law and Criminology (UANL- FACDYC), and the Mexico Institute of the Woodrow Wilson International Center for Scholars. Any findings, conclusions and/or opinions are those of the authors and not necessarily those reflected by the involved organizations.

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Abbreviation INDEX

AEM	Association of Mexican Entrepreneurs, <i>Asociación de Empresarios Mexicanos</i>
ASEA	National Agency for Industrial Safety and Environmental Protection, <i>Agencia de Seguridad, Energía y Ambiente</i>
ARES	Authorizations for Hydrocarbons Assessment and Surface Exploration, <i>Autorización para el Reconocimiento y Exploración Superficial de Hidrocarburos</i>
BMV	Mexican Stock Exchange, <i>Bolsa Mexicana de Valores</i>
CENAGAS	National Center of Natural Gas Control, <i>Centro Nacional de Control del Gas Natural</i>
CENACE	National Center of Energy Control, <i>Centro Nacional de Control de Energía</i>
CIE	Economic Research Center, <i>Centro de Investigación Económica</i>
CNH	National Hydrocarbons Commission, <i>Comisión Nacional de Hidrocarburos</i>
CNIH	National Center of Hydrocarbon Information, <i>Centro Nacional de Información de Hidrocarburos</i>
COFEMER	Federal Commission on Regulatory Improvement, <i>Comisión Federal de Mejora Regulatoria</i>
CONAGUA	National Water Commission, <i>Comisión Nacional del Agua</i>
CRE	Energy Regulatory Commission, <i>Comisión Reguladora de Energía</i>
DOF	Federal Official Gazette, <i>Diario Oficial de la Federación</i>
E&P	Exploration and Production, <i>Exploración y Producción</i>
EIA	Energy Information Administration
EPA	Environmental Protection Agency
FMP	Mexican Petroleum Fund, <i>Fondo Mexicano del Petróleo</i>
IMPI	Mexican Institute of Industrial Property, <i>Instituto Mexicano de la Propiedad Industrial</i>
IMSS	Mexican Social Security Institute, <i>Instituto Mexicano del Seguro Social</i>
INDAABIN	Institute of Administration and Appraisals of National Assets, <i>Instituto de Administración y Avalúos de Bienes Nacionales</i>
INEGI	National Institute of Statistics and Geography, <i>Instituto Nacional de Estadística y Geografía</i>
ISN	Payroll Tax, <i>Impuesto Sobre Nominas</i>
LGSM	General Law of Commercial Companies, <i>Ley General de Sociedades Mercantiles</i>
LH	Hydrocarbons Law, <i>Ley de Hidrocarburos</i>
LIH	Hydrocarbons Revenue Law, <i>Ley de Ingresos sobre Hidrocarburos</i>
PEMEX	Mexican Petroleum, <i>Petróleos Mexicanos</i>
PEP	Pemex Exploration and Production, <i>Pemex Exploración y Producción</i>
PROFEPA	Federal Attorney for Environmental Protection, <i>Procuraduría Federal de Protección al Ambiente</i>
PSC	Production Sharing Contract, <i>Contrato de Producción Compartida</i>
RFC	Federal Taxpayer Registry, <i>Registro Federal de Contribuyentes</i>
RNIE	National Registry of Foreign Investment, <i>Registro Nacional de Inversiones Extranjeras</i>
RPC	Public Registry of Commerce, <i>Registro Público de Comercio</i>
SAT	Tax Administration Service, <i>Servicio de Administración Tributaria</i>
SEDATU	Ministry of Agrarian, Territorial and Urban Development, <i>Secretaría de Desarrollo Agrario, Territorial y Urbano</i>
SE	Ministry of Economy, <i>Secretaría de Economía</i>
SEGOB	Ministry of Interior, <i>Secretaría de Gobernación</i>
SEMARNAT	Ministry of Environment and Natural Resources, <i>Secretaría de Medio Ambiente y Recursos Naturales</i>
SENER	Ministry of Energy, <i>Secretaría de Energía</i>
SHCP	Ministry of Finance, <i>Secretaría de Hacienda y Crédito Público</i>
SST	Workplace Safety and Health, <i>Seguridad y Salud en el Trabajo</i>
SPEs	State Productive Enterprises, <i>Empresas Productivas del Estado</i>
STPS	Ministry of Labor and Social Welfare, <i>Secretaría del Trabajo y Previsión Social</i>
UANL	Autonomous University of Nuevo León, <i>Universidad Autónoma de Nuevo León</i>
UTSA	University of Texas at San Antonio

PREFACE

Mexico's energy reform offers the prospect of enormous wealth generation over the next 5 years. The opening of the oil and gas sector, along with the transformation of the power industry, will both drive hydrocarbons production and propel Mexican competitiveness. Enormous expectations have been created by the reform, encouraged heavily by both the Mexican government and international investors.

The shale prospects of Mexico are an integral part of this equation, and the Sabinas, Burgos, Tampico-Misantla and Veracruz shale basins hold impressive potential. The development of these onshore resources implies significant investments in infrastructure, tax revenue for local authorities, job creation and the possibility of profit sharing through land access agreements. The experience of the last decade in Texas and other parts of the United States supports this argument. As multiple studies - including the impressive UTSA 2014 report - have shown, the direct and indirect economic impact of the shale industry is indeed enormous and transformative. The harnessing of hydrocarbons wealth in the subsoil, combined with the development of the services sector and major infrastructure projects, will mean the creation of more than 196,000 jobs per year and the generation of more than \$137 billion for the state of Texas by 2023. In 2013 alone, shale plays supported 155,000 jobs and generated around \$4.4 billion in tax revenue for the state.

However, the conjunction of diverse factors, including the global price environment, the complications of the contract terms offered by the Mexican government, social license issues and infrastructure limitations all complicate the panorama for shale development. A number of analysts have recently noted that expectations for the development of the country's shale reserves should be moderated and that the time horizon for the development of the sector should be extended to between 5-10 years.

This is not to say that the benefits of shale development in Mexico will not be realized. On the contrary, what the experience of the past twelve months has shown us is that a more complicated business environment serves to drive innovation. The new technologies, particularly those which lower costs and assist in hitting the "sweet spot" of shale plays, have meant that, shale plays that were unprofitable under \$100/barrel have become profitable even in a period of lower oil prices.

Rather than a temporal factor such as the international oil price, shale development in Mexico will depend upon the successful navigation of Mexico's national and local environment, and this study provides a road map for understanding both the energy reform process and the conditions in the states that hold shale reserves. By shedding light on these conditions, it is hoped that business and governments will be able to maximize the potential from shale, working together with local communities to generate the prosperity and employment that are now within reach.

Duncan Wood,

Director of the Mexico Institute of the Woodrow Wilson International Center for Scholars

PART ONE

1. Economic Analysis Introduction

Opportunities for unconventional or shale oil and gas production in Mexico are in the earliest stages of development. While shale gas production increased significantly in the U.S. over the past decade or so, and shale oil production over the past few years, no other country in the world has yet to replicate that success. Due to its close proximity to major shale field development in South and West Texas, Mexico is particularly well positioned to take advantage of unconventional extraction techniques. However significant challenges will have to be addressed.

Mexico sits atop an estimated 545 trillion cubic feet (Tcf) of shale natural gas reserves, and additional trillions of cubic feet of conventional reserves, nevertheless the country has remained a net importer of natural gas. Estimates for unconventional oil reserves in Mexico are 13 billion barrels (EIA 2013), though in both cases, the lack of available geological information remains an issue.

The importance of energy reform in Mexico cannot be understated. Despite increasing amounts of investment on exploration and production (E&P) by Petróleos Mexicanos (Pemex), oil production in the country peaked in 2004. Were it not for the prospect of energy reform implementation, Mexico would likely transform from a net exporter of crude oil to a net importer within a few years.

The bulk of Mexico's shale prospects appear to lie in the north and northeastern sections of the country, where infrastructure is often largely undeveloped. This means that in order to tap the country's bounty of shale oil and gas, infrastructure such as roads, housing, rail, pipeline and many others will have to be built out first. The ability to develop a suitably skilled workforce will be key to long-term success. Security issues must also be addressed.

The potential unconventional oil and gas production in Mexico poses many interesting challenges in the wake of the recently enacted energy reform. The landscape in which unconventional extraction will

occur and forecasts about how that will occur are the focus of a planned comprehensive study to be undertaken by the University of Texas at San Antonio's Institute for Economic Development, the Universidad Autónoma de Nuevo León, the Asociación de Empresarios Mexicanos, and the Woodrow Wilson Center.

This **preliminary report** focuses on the impacts the Energy Reform will have on the Mexican Economy. The core study area concentrates on the economic impact on the following states: Coahuila, Nuevo León, Tamaulipas and Veracruz. This report contains a general overview on the Energy Reform, an economic background on oil and natural gas (especially trade between the U.S. and Mexico), a state level profile, infrastructure, and educational issues specific to oil and natural gas activities.

The purpose of the study is to gauge the growth and the effects that the oil and natural gas industries have for residents and decision makers in the aforementioned Mexican States. Although industry developments and other social issues may be still considered, the scope and breadth of these impacts are very large, and tangible effects on the region will be felt for years to come.

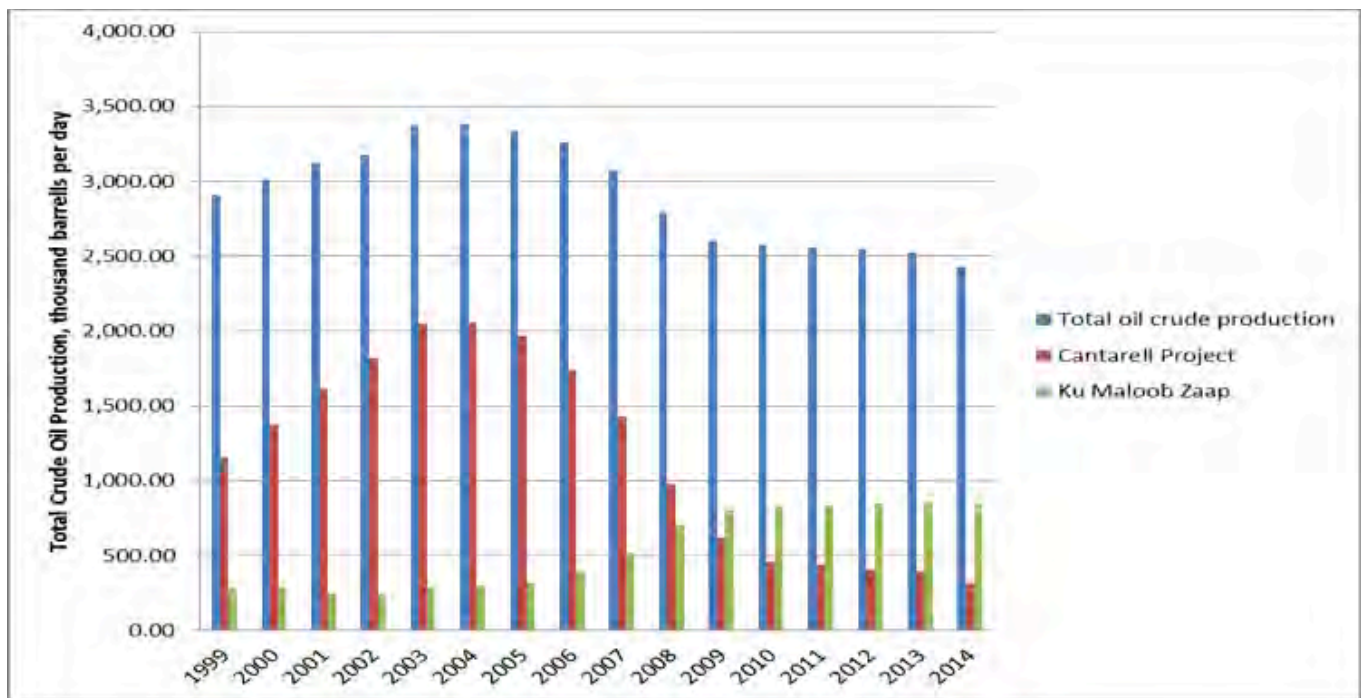
A Brief History of PEMEX

Pemex was created in 1938, after then-Mexican President Lázaro Cárdenas expropriated all foreign oil assets in Mexico and nationalized them, following years of conflict over the country's resources. As such, Pemex was seen as something of a national symbol.

By 2013, Pemex was no longer the juggernaut it once was. It had fully developed the Cantarell oil field in the Gulf of Mexico but despite investments in exploration and extraction, crude oil production declined from 3.4 million barrels of oil per day in 2004 to close to 2.5 million barrels of oil per day in 2014

million by 2013.¹ Pemex has also been hindered by a combination of burdensome regulations, low worker productivity, high taxes, high pensions, and a control from the Mexican government limiting its ability to invest in infrastructure and new technologies.

Figure 1
Mexico Crude Oil Production

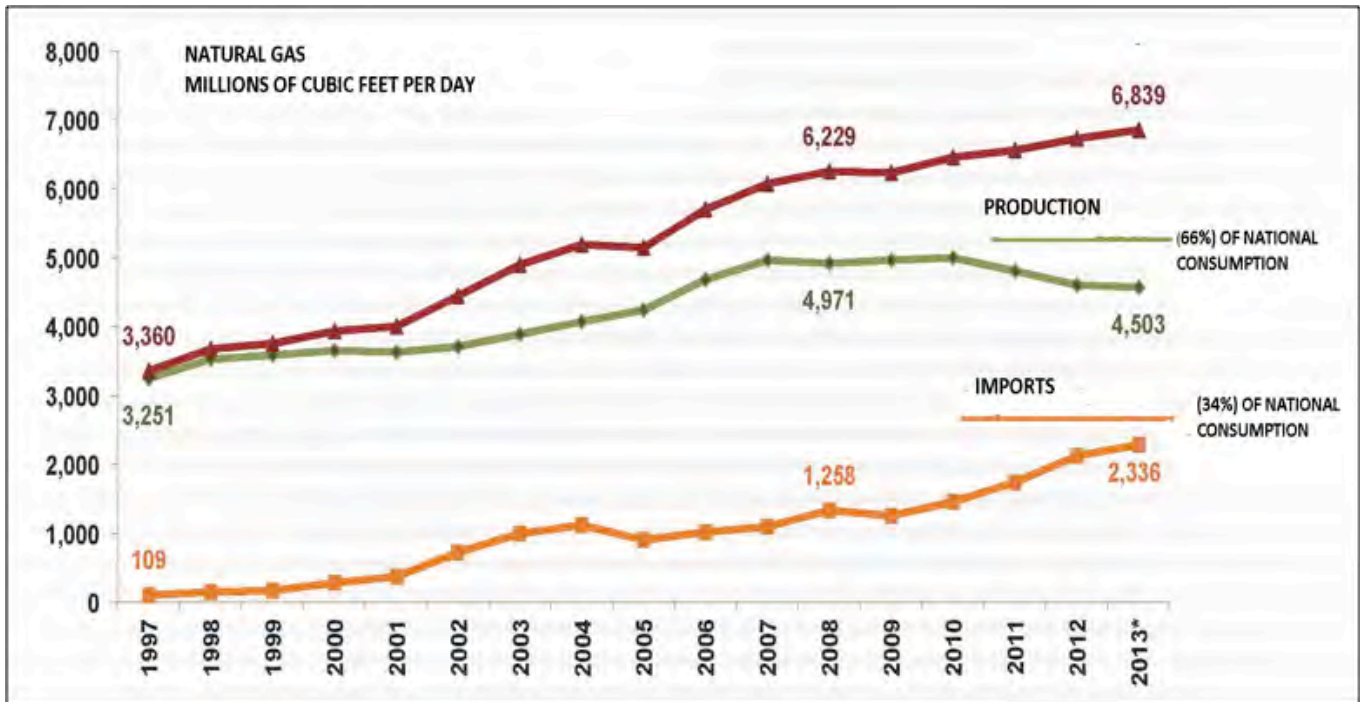


Source: Pemex

Figure 1 shows Mexico's oil production. The bars in blue stand for the total oil crude production for the years starting in 1999 to 2014. The bars in red stand for the production of the Cantarell Project, and the green bars represent the amount of oil produced in Ku Maloob Zaap.

¹ Presentation by Rodrigo Hernández Ordóñez, "Oportunidades de la Reforma-Ronda Uno y regulación en Mexico" In Shale World Mexico, March 10, 2015 Mexico. Comisión Nacional de Hidrocarburos (CNH). Historia. Retrieved from: <http://www.cnh.gob.mx/1100.aspx>

Figure 2
Mexico's Dry Natural Gas Outlook



Source: CANACINTRA. Pemex, la industria petrolera y la reforma energética.

In figure 2, for dry natural gas, the orange line shows the amount of million cubic feet imported per day (which represents 34 percent of national consumption). The green line displays the production of natural gas in the country (represents 66 percent of national consumption). The red line indicates consumption in the country. If the trend continues, Mexico's natural gas imports will surpass its production.

Reform

President Enrique Peña Nieto ran on a campaign of economic reform, and after winning the 2012 election, his party worked with the other ruling parties to create a "Pact for Mexico" that included reforms of the energy, finance, education, and telecommunications sectors, among others. Through the "Pact for Mexico" the current administration negotiated with all the parties represented in that legislative session the approval and passing of 11 important reforms.

In regards to energy production, the initial proposed reforms focused on removing hydrocarbons from the sectors controlled directly by the government. Thus opening up oil and gas fields through exploration and production contracts with the Mexican government, as well as the granting of permits for the development of a robust and well integrated hydrocarbons infrastructure.

Secondary proposed reforms focused on the internal workings of Pemex: changes to give the company control over its own budget, increase accountability, and modifications to the fiscal structure of the firm.

The reforms passed into law in December 2013, with several features. The new legislation gives the state ownership of subsoil hydrocarbon resources. However, private companies will be allowed to take ownership of these resources once extracted. In order to make that happen, the reform created four different contract structures:

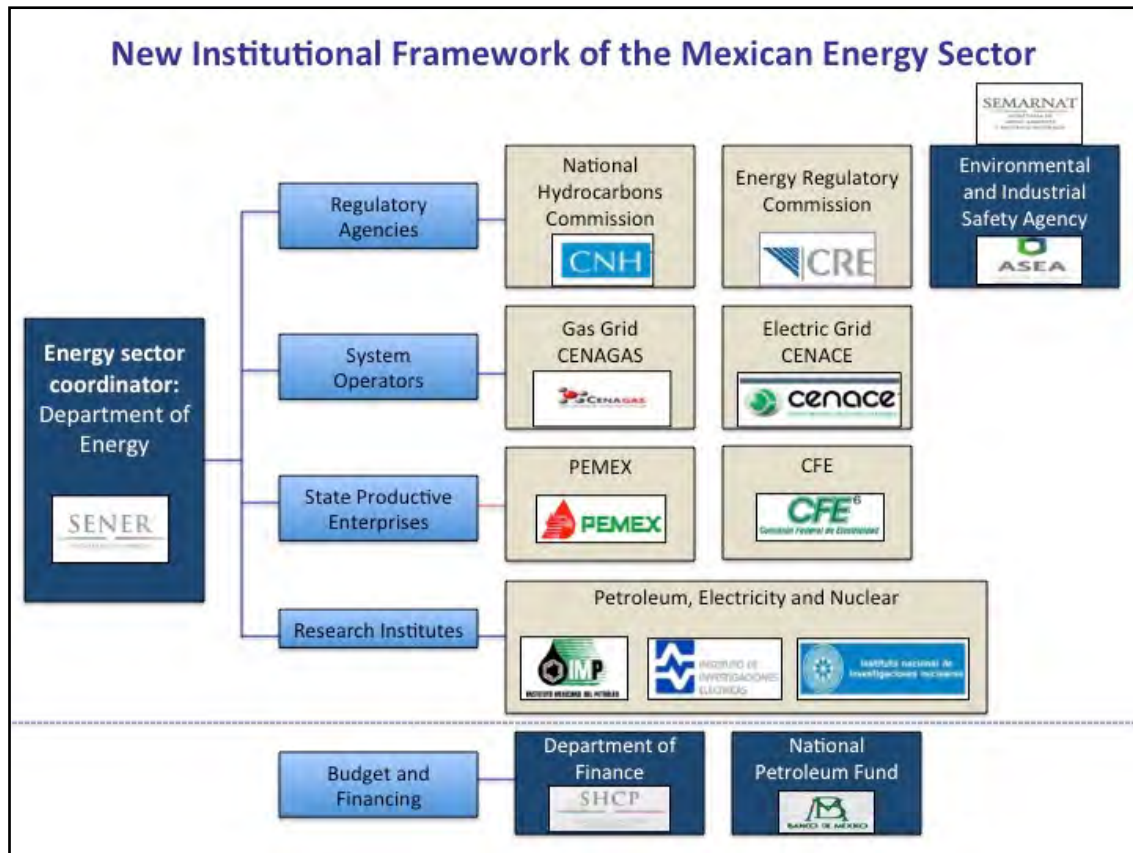
1. Service contracts, where companies are contracted by the State, and paid in cash by the government.
2. Profit-sharing contracts, where companies are also paid in cash.
3. Production sharing contracts, where companies will be paid in kind with a portion of the hydrocarbons produced.
4. Licenses, where companies can take ownership of hydrocarbon resources at the wellhead, and pay their fees also with hydrocarbons.

Beginning in 2016, the reform will open the way for refining, transportation, storage, natural gas processing, and petrochemical sectors to private investment. The energy reform legislation includes reclassifying Pemex as State Productive Enterprise. Furthermore, the reform strengthens and redefines the regulatory controls of four federal entities responsible for the hydrocarbon industry:

1. Ministry of Energy (SENER)
2. Ministry of Finance (SHCP)
3. National Hydrocarbons Commission (CNH)
4. Energy Regulatory Commission (CRE)

Energy reform legislation also provides for the creation of a National Agency for Industrial Safety and Environmental Protection for the Hydrocarbons Sector (ASEA). The creation of two system operators: CENAGAS to manage the gas grid, and CENACE to control the electric grid, both agencies created with the intention to allow for open market conditions. Finally, the reform measures have established the Mexican Petroleum Fund, a sovereign wealth fund managed by the Central Bank. The following figure shows the new restructured institutional framework for the energy sector:

Figure 3
Institutional Framework



Secondary legislation was passed into law in August 2014, with several features. Internal reforms are intended to allow Pemex greater autonomy from the federal government. Also, the legislation lowered the tax rate from 79 percent to 65 percent. The new laws allow Pemex to keep some of the existing fields through the entitlements made and announced as part of "Round Zero." Once the secondary reforms have been implemented, private companies will pay royalties and taxes based on the price of oil in the world market.

An important feature of the reforms requires foreign companies to comply with the national content requirements of 25 percent in 2015; increasing gradually to 35 percent by 2025 (the requirements exclude deep water exploration and drilling operations). In addition, those companies must negotiate surface land access for exploration and drilling, which includes compensation to the owners while the land is occupied.

In 2008, the National Hydrocarbons Commission (CNH) was created² to implement preliminary efforts for the energy reform. The CNH has similarities with the Texas Railroad Commission in that the agency will in large regulate Mexico's oil and gas industry. For the previous 76 years, Pemex has been the *de facto* regulatory body in Mexico. The agency has been designated as the lead entity to gather and manage the hydrocarbons information, supervise and organize the bidding rounds, and award, execute and supervise contracts with private companies for exploration and production purposes. However, the CNH is still ramping up operations and remains short of qualified personnel.

² Mexico. Comisión Nacional de Hidrocarburos (CNH). Historia. Retrieved from: <http://www.cnh.gob.mx/1100.aspx>

As the first phase of reform implementation, Round Zero results were announced in August 2014, which awarded Pemex 83 percent of Mexico's proven reserves, as well as 21 percent of its prospective reserves (ten percent less than it had asked for). While this round of bidding did not open up fields to private participation other than some fields identified for joint-ventures projects with Pemex, the process did indicate how many fields will be open for investment in future rounds.

Additionally, in the next several months, Pemex will undergo necessary restructuring. The restructuring started April 2015 when seven new subsidiaries were created:³

- **Pemex Cogeneración y Servicios:** Its purpose is the generation, supply and marketing of power and thermal energy, including without limitation, energy produced on power and cogeneration plants, as well as to provide technical and administration services related to such activities to Pemex, EPEs, affiliate companies and third parties, for its own account or companies that participate directly or indirectly.
- **Pemex Etileno:** Its purpose is the production, distribution and commercialization of methane, ethane and propylene products for its own account or third parties.
- **Pemex Exploración y Producción:** Its exclusive purpose is the exploration and extraction of oil and solid, liquid or gas hydrocarbons on national territory, on the nation's exclusive economic zone and abroad.
- **Pemex Fertilizantes:** Its purpose is the production, distribution and commercialization of ammonia, fertilizers and its by-products, as well as to provide related services.
- **Pemex Logística** Its purpose is to provide the transportation and storage service of hydrocarbons, petroleum by-products and petrochemicals and other related services to Pemex, EPE's, affiliates and third parties, through strategies of movement through pipelines as well as land and sea means; and the sale of capacity for its storage and handling, among other activities.
- **Pemex Perforación y Servicios:** Its purpose is to provide drilling, completion and repair of wells services, and provide wells services, among other activities.
- **Pemex Transformación Industrial:** Its main purposes are the refining, transformation, processing, import and export, commercialization, retailing to the public, preparation and sale of hydrocarbons, petroleum by-products, natural gas and petrochemicals.

Some of the implementing actions, such as empowering of the regulatory agencies, training for future industry employees, and the first round of public investment, have begun. In a sense, the easy part has been accomplished – the main legislative platform, the bulk of the secondary legislation, and Presidential rulings have been passed. The next and more challenging phase will be implementation of the reforms.

Prior to Round One and to the energy reform legislation, exploration and production, along with midstream (transportation, storage) and downstream (refining) activities for oil and gas were not open to the private sector.

³ Mexico. Diario Oficial de la Federación (DOF). April 28,2015. Retrieved from: <http://www.dof.gob.mx>

Natural gas in Mexico has been and will continue to be in demand. According to the Ministry of Energy's estimates, a 3.8 percent increase in average annual demand for the next 14 years is expected⁴ due to electricity generation demand. A key element of the energy reform was the creation of CENAGAS in September 2014. CENAGAS will administer, coordinate and manage efficiently the pipeline grid and the storage of natural gas.⁵

In 2008, ex-President Felipe Calderón proposed that Congress should approve permits for importation of petrochemicals and refined products. However, that effort failed. Now with a more comprehensive energy reform process, pipeline transportation and storage of petroleum, gasoline, diesel, fuel oil, and liquified petroleum gas (LPG) will now be permitted. In November 2014, CRE issued regulations for some of the permits awarded in January 2014. Pemex was also subject to these new regulations. Additional reform measures related to petrochemicals and refined products include development of pipelines that border the U.S., pipelines from ports to airports for the transport of jet fuel, as well as pipelines to transport crude oil from offshore platforms to refineries. By 2016, CRE is expected to begin issuing permits to independent service stations. In 2017, Mexico's Ministry of Energy (SENER) is expected to begin issuing import permits to private companies. In 2018, plans call for energy prices to be set by the market.

Round One

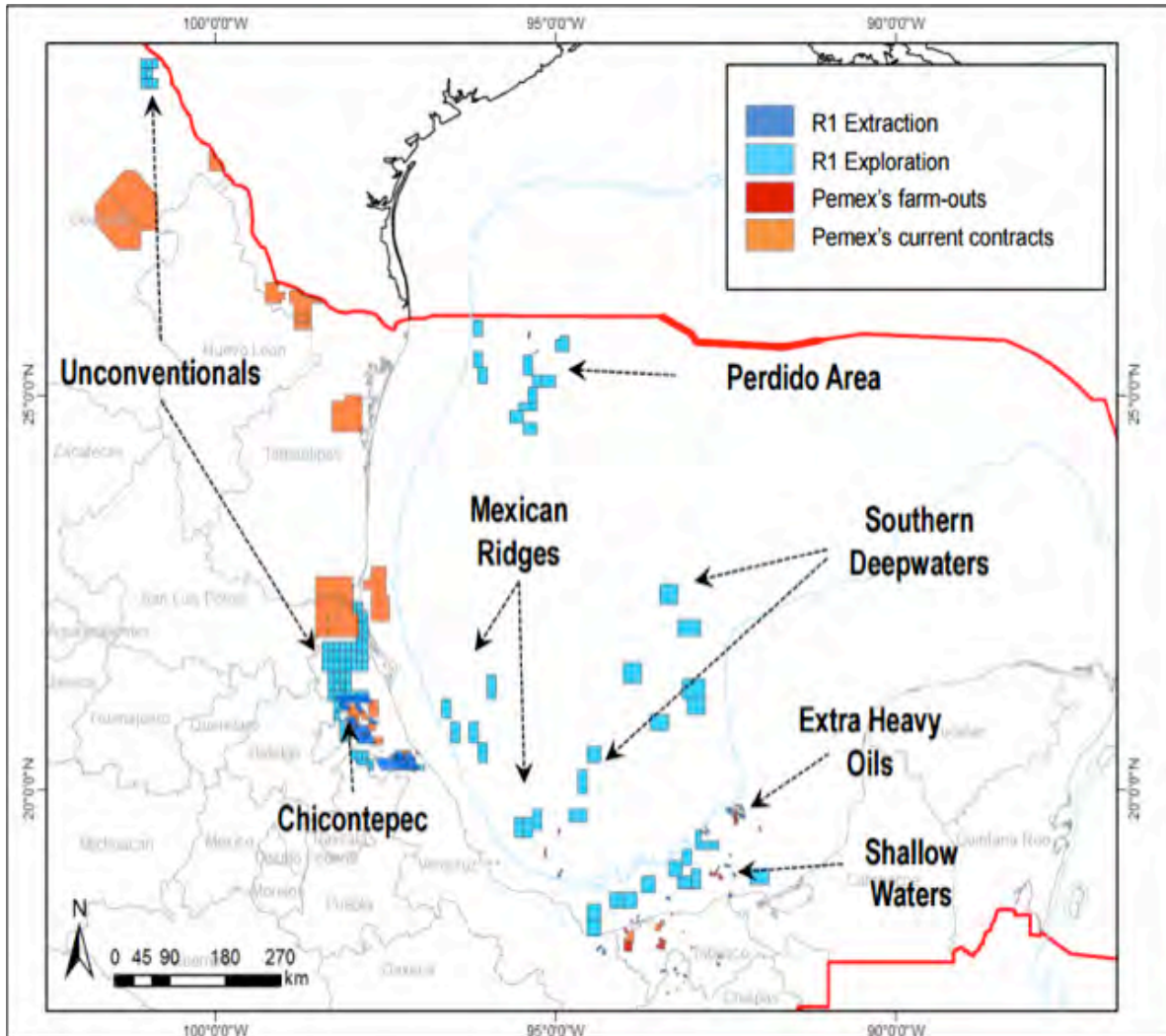
Round One started in August of 2014 and will award contracts for exploration and production in different oil and gas fields. Moreover, it announced that 169 blocks were going to be offered in five different stages. In order to begin the tenders, each block must pass through a process approved by CNH. The applicable blocks are the equivalent of a 28,500 square kilometers (11,003 square miles) area with 2P reserve (3,382 Millions of Barrels of Oil Equivalent or MMboe), and with the possibility of another 14,606 MMboe reserve. Furthermore, with the implementation of Round One, an annual investment of \$8.5 billion for the 2015 and 2016 years projects is expected.

The bidding process for the Round One blocks began with the first tender for exploration in shallow waters on December 11, 2014. The winning bidders will be announced in July 2015. The blocks that will be awarded range in an area from 116 to 500 square kilometers (45 to 193 square miles). The total area of those 14 blocks is close to 4,222 square kilometers (1,630 square miles). In February of 2015 a second tender for production only in shallow waters offered blocks in nine production sharing contracts. On May 12th, 2015, 26 fields were offered in the third tender of Round One, the first invitation to bid for onshore E&P projects. These fields called "mature fields" in the states of Chiapas, Nuevo León, Tabasco, Tamaulipas and Veracruz will be granted through licenses contracts and will be awarded in December of 2015. Mexican authorities have announced that the fourth and fifth tender for unconventional fields and deep water projects will be announced in the second semester of 2015. Besides oil price considerations, government officials indicate they are obtaining additional feedback from the industry in order to launch an attractive tender for those fields. Texas authorities have commented that this delay provides additional time to intensify efforts to develop a better trained workforce and to develop the required infrastructure to operate in those fields.

4 SENER; *Prospectiva del Mercado de Gas Natural 2012-2026*. Retrieved from http://www.sener.gob.mx/res/pe_y_dt/pub/2012/pgn_2012_2026.pdf

5 Mexican embassy in the U.S. Retrieved from <http://embassyofmexico.org/web/KeyElementsoftheEnergyReform.pdf.pdf>

Figure 4
Round One Blocks



CENAGAS

In an effort to improve the management, administration, and operation of the National Integrated Transportation and Storage System of Natural Gas, the new institution CENAGAS was created. The agency has been charged with guaranteeing the continuity and security in the provision of services to support the Mexican territory.

David Madero, General Director of CENAGAS, has said that the institution will also be in charge of dealing with permit holders and developing clear rules to level the price in order to participate in the gas industry.

CENAGAS is independent from the permit holders. The agency's charter will be to auction the strategic ducts, which are expected to receive significant interest by public/private companies. Infrastructure standards will be developed based on international standards of safety and quality.

One of the goals of CENAGAS is to improve the existing infrastructure, which currently is composed of 9,343 kilometers of gas transportation ducts.⁶ In addition, there are 15 compression stations, with a total capacity of 431,630 horsepower (HP), from which 293,650 HP correspond to Pemex Gas and the remaining 137,510 HP correspond to private initiatives.⁷ There is a transportation capacity of 5,012 MMpcd (million cubic feet per day) in substitutes for natural gas (SNG) and 90 MMpcd in the Naco-Hermosillo Duct.⁸ Additionally, there are 28 injection points, seven processing plants and eight importation points.

With CENAGAS, the former monopoly of gas transportation, management and commercialization will be broken up, giving private companies the opportunity to take a role in the distribution process. CENAGAS must guarantee the continuity and security of natural gas supply by operating under the principles of efficiency, transparency and objectivity. This implies that CENAGAS will receive the corresponding transportation rates, according to a price set by the market, with the goal of operating a safe and efficient system.

According to the director of CENAGAS, in order for Mexico to close the gap between the development standards of first world nations and its own, it is essential that the country invest in infrastructure. "The difference between a dirt road and a paved one makes an important difference for children that attend school, especially in rural areas. Recent reforms, and the current National Infrastructure Program seek to ensure that reliable gas transportation infrastructure will have positive economic impact in Mexico across a range of industries."



6 Pemex-Gas y Petroquímica Básica. Retrieved from: <http://www.gas.pemex.com/PGPB/Conozca+Pemex+Gas/Infraestructura/>

7 SENER. Procesamiento, Almacenamiento y Transporte de Gas. Retrieved from: <http://www.energia.gob.mx/portal/Default.aspx?id=1510>

8 San Diego.com. Retrieved from: <http://www.sandiegored.com/noticias/61439/The-creation-of-CENAGAS-accelerates-the-implementation-of-the-energy-reform/>

2. Trade Between the United States and Mexico

Mexico is the United States' third largest trading partner after China and Canada with \$536 billion dollars of goods and services traded between the two countries in 2012.⁹ The oil and gas trade between Mexico and the U.S. accounted for approximately \$65 billion.¹⁰

2-1 Overall trade between Mexico and the United States

The United States exports span more than 230 destinations, with Canada and Mexico accounting for more than one-third of the total. On the other hand, Mexico exports more to the U.S. in goods and services in just over a month than it does in one year to the 27 countries of the European Union.¹¹

Exports from Mexico to the United States

After China and Canada, Mexico is the United States' third largest supplier of goods, accounting for \$280 billion of trade, which amounts to 12.4 percent of all goods imported by the United States in 2013.¹² The table below shows the top five categories of goods traded.

Table 1
Top Five Exports from Mexico to the United States by NAICS Code

Category	NAICS code	Amount, in billions
Vehicles	4231	\$59.6
Electrical machinery	3353	\$57.4
Machinery	333	\$42.6
Mineral fuel and oil	211	\$34.8
Optic and medical instruments	423450	\$10.7

Source: Office of the United States Trade Representative; Mexico

9 Office of the United States Trade Representative; Mexico; <http://www.ustr.gov/countries-regions/americas/mexico>

10 Energy Information Administration; Mexico Week: U.S. is Mexico's primary energy trade partner amid shifting trade dynamics; <http://www.eia.gov/todayinenergy/detail.cfm?id=11231>

11 U.S. Embassy in Mexico web site.; <http://mexico.usembassy.gov/eng/econ.html>

12 Office of the United States Trade Representative; Mexico; <http://www.ustr.gov/countries-regions/americas/mexico>

Imports to Mexico from the United States

Mexico received approximately \$226 billion in imports from the United States, which resulted in a \$54 billion dollar trade surplus for Mexico.

Table 2 shows the top five categories of goods sent from the United States to Mexico. Respective NAICS codes have been converted from their exporting codes.

Table 2
Top Five Imports to Mexico from the United States by NAICS Code

Category	NAICS code	Amount, in billions
Machinery	333	\$38.5
Electrical machinery	3353	\$36.7
Mineral fuel and oil	211	\$23.0
Vehicles	4231	\$21.6
Plastic	326	\$15.3

Source: Office of the United States Trade Representative; Mexico

2-2 Overall trade between Mexico and Texas

Texas' largest market is Mexico. Texas posted merchandise exports of \$102.6 billion to Mexico in 2014, representing 35.5 percent of the state's total merchandise exports. Mexico was followed by Canada (\$31.1 billion), Brazil (\$11.8 billion), China (\$11.0 billion), and Netherlands (\$8.9 billion).¹³

Mexico exported almost \$95 billion of goods to Texas, accounting for over 30 percent of total Mexican exports to the United States.¹⁴

Texas sent approximately \$100 billion of goods to Mexico in 2013.¹⁵ The table below shows the top three categories of goods imported to Mexico from Texas. Respective NAICS codes have been converted from their exporting SIC codes.

¹³ International Trade Administration, Texas Exports, jobs, and foreign investment at <http://www.trade.gov/mas/ian/statereports/states/tx.pdf>

¹⁴ Census Bureau; State imports for Texas; <http://www.census.gov/foreign-trade/statistics/state/data/imports/tx.html#ctry>

¹⁵ International Trade Administration; TradeStats Express; <http://tse.export.gov/TSE/TSEhome.aspx>

Table 3
Top Three Imports to Mexico from Texas by NAICS Code

Category	NAICS code	Amount, in billions
Computers and electronics	334	\$19
Petroleum and coal products	21	\$9.5
Transportation equipment	4231	\$8.5

Source: Woodrow Wilson International Center for Scholars; Working Together: Economic ties between the United States and Mexico

2-3 Oil and gas consumption and production

Mexico's demand for natural gas has increased substantially in recent years, owing mostly to its use in electric generation. On the other hand, production of natural gas has been declining in recent years

Mexico

Oil consumption in Mexico for 2013 was around 2 million barrels per day, while crude oil production was around 2.5 million barrels per day, which makes Mexico a net oil exporter. Although Mexico exports¹⁶ crude oil products, it is a net importer of refined oil products.¹⁷

For natural gas, Mexico produced 4.5 million cubic feet per day, while consuming almost 6.2 million cubic feet daily. The shortfall in production is met mainly with pipeline imports from the United States, with the rest coming from Liquefied Natural Gas imports from other countries. Between 2013 and 2014, Mexico imported over 650 billion cubic feet of natural gas from the U.S. according to the Energy Information Administration (EIA).

¹⁶ Energy Information Administration; Countries – Overview/Data; <http://www.eia.gov/countries/country-data.cfm?fips=MX#pet>

¹⁷ *Ibid.*

Table 4
Mexico Total Crude Oil, Natural Gas Production and Consumption

Year	Consumption		Production	
	Crude Oil in thousands of barrels per day	Dry Natural Gas in million cubic feet per day	Crude Oil in thousands of barrels per day	Dry Natural Gas in million cubic feet per day
2013	2,044.27	6,248	2,561.86	4,493
2012	2,085.60	6,641	2,592.51	4,577
2011	2,112.56	6,456	2,599.85	4,779
2010	2,080.44	6,264	2,621.14	4,928
2009	2,069.61	5,848	2,645.84	4,717
2008	2,161.12	5,834	2,838.99	4,641
2007	2,172.79	5,548	3,142.95	4,598
2006	2,122.93	5,091	3,345.43	4,104
2005	2,116.67	4,538	3,423.12	3,695
2004	2,069.20	4,530	3,475.83	3,430
2003	2,015.66	4,492	3,458.68	3,836

Source: Energy Administration; Countries-Overview/Data

United States

In the United States, oil consumption has been relatively steady for the last five years, hovering around 18-19 million barrels per day. This is significantly higher than the 2013 production of 7.4 million barrels per day (See Table 5), however, it is important to note that U.S. crude oil production has risen from around 5 million barrels in 2008. The rise in production in the U.S. over the past few years is directly attributable to shale oil, which highlights the potential for increases in shale-related energy production in Mexico.

Natural gas consumption and production follows a similar trend, with the U.S. consuming slightly more than it produced in 2013, even as production gains outpace the growth in its usage.

Table 5
United States Total Crude Oil, Natural Gas Production and Consumption

Year	Consumption		Production	
	Crude Oil in thousands of barrels per day	Dry Natural Gas in million cubic feet per day	Crude Oil in thousands of barrels per day	Dry Natural Gas in million cubic feet per day
2013	18,961.13	71,334	7,441.49	66,668
2012	18,490.21	69,953	6,496.70	65,845
2011	18,882.07	67,060	5,644.79	62,745
2010	19,180.13	65,992	5,481.87	58,399
2009	18,771.40	62,767	5,349.83	56,504
2008	19,497.96	63,773	5,000.06	55,229
2007	20,680.38	63,299	5,076.98	52,784
2006	20,687.42	59,449	5,087.87	50,695
2005	20,802.16	60,312	5,181.52	49,454
2004	20,731.15	61,378	5,440.92	50,934
2003	20,033.51	61,033	5,649.24	52,325

Source: Energy Administration; Countries-Overview/Data

Texas

Texas is number one in the U.S. for crude oil reserves and production. It has close to one-third of the U.S. total crude oil reserves. Texas also tops the nation in total petroleum consumption, and it is number one among the states in the consumption of distillate fuel oil and liquefied petroleum gases (LPG). Texas' consumption of LPG, at more than sixty percent of the country's total, is greater than the LPG consumption of all other states combined. Most of the LPG is for industrial purposes where it is used as a chemical feedstock in petrochemical plants.¹⁸

¹⁸ From the EIA site at: <http://www.eia.gov/state/analysis.cfm?sid=TX>

Table 6
Texas Total Crude Oil, Natural Gas Production and Consumption

Year	Consumption		Production	
	Crude Oil in thousands of barrels per day	Dry Natural Gas in million cubic feet per day	Crude Oil in thousands of barrels per day	Dry Natural Gas in million cubic feet per day
2013	3507.88	10,660	2,529.00	18,893
2012	3405.62	10,173	1,979.00	18,169
2011	3374.91	9,847	1,449.00	17,210
2010	3130.42	9,334	1,169.00	17,520
2009	3126.22	9,775	1,094.00	17,970
2008	3422.94	9,707	1,109.00	15,715
2007	3467.22	9,479	1,072.00	14,177
2006	3395.64	9,660	1,075.00	13,482
2005	3520.48	10,775	1,076.00	12,896
2004	3404.77	11,162	1,073.00	13,455
2003	3507.88	660	1,098.00	18,893

Source: Energy Administration; Countries-Overview/Data

In Texas oil consumption has been also stable since 2003 up to 2012, hovering around 3.1 and 3.5 million barrels per day

2-4 Oil and gas trade between Mexico and the United States

Mexico is still a major exporter of crude oil products to the United States. In 2013, Mexico was the third-largest oil supplier, with 12 percent and almost \$32 billion dollars of the U.S. total supply. The U.S. receives approximately 71 percent of Mexico's total oil exports.

The decrease in the amount of crude oil sent to the United States was due, until lately, in large measure to the declining production from Pemex, brought in part by the exhaustion of the Cantarell oil field in the Gulf of Mexico, which was the largest production field in Mexico. More recently, the increased extraction of oil from US shale oil plays has exacerbated this decrease.

The United States does receive some natural gas from Mexico, but the amount is limited and is nowhere near the amount of natural gas that is sent from the US to Mexico, as can be seen in Table 7.

Table 7¹⁹
Oil and natural gas exports from Mexico to the United States

Year	Crude oil & petroleum products in thousands of barrels per day	Natural gas (million cubic feet)
2013	919	1,069
2012	1,035	314
2011	1,206	2,672
2010	1,284	29,995
2009	1,210	28,296
2008	1,302	43,314
2007	1,532	54,062
2006	1,705	12,749
2005	1,662	9,320
2004	1,665	0
2003	1,623	0

Source: Energy Information Administration; Petroleum & Other Liquids- Data- U.S. Imports from Mexico of Crude Oil and Petroleum Products

While Mexico is a net exporter of crude oil, it is a net importer of refined oil products: thus, in 2012, while Mexico exported around a million barrels per day of crude oil, it was also importing around 570,000 barrels per day of refined petroleum products from the United States. This is for a variety of reasons: lack of total refining capacity, as well as a specific lack of refining capacity for the heavy crudes that are produced domestically. In addition, not only is domestic refining capacity limited, it is also poorly maintained, meaning that Mexico can refine less than it should be able to nominally.

¹⁹ Energy Information Administration; Natural Gas – Data – U.S. Natural Gas Imports by Country; <http://www.eia.gov/dnav/ng/hist/n9102mx2a.htm>

Table 8^{20, 21}

Oil and natural gas exports from the United States to Mexico

Year	Crude oil & petroleum products in thousands of barrels per year	Natural gas (million cubic feet)
2013	194,025	658,496
2012	206,762	619,955
2011	207,870	498,893
2010	163,439	333,459
2009	117,454	338,490
2008	121,835	365,449
2007	101,743	291,860
2006	92,996	322,128
2005	97,868	305,196
2004	76,413	397,454
2003	83,385	345,235

Source: Energy Information Administration; Petroleum & Other Liquids, Natural Gas

2-5 Transportation

Since Mexico does not have any international oil pipeline connections, the majority of its crude oil exports are handled through three port terminals: Cayo Arcas, Dos Bocas, and Pajaritos, which are all on the Gulf Coast. The majority of these exports (71 percent) are shipped to refineries along the U.S. Gulf Coast, mostly in Texas and Louisiana.²²

Natural gas is handled through eight pipelines, six of which cross the Mexico-Texas border, although only two are active at this time.²³

Even as Mexico exports crude oil, it imports refined petroleum products from the United States. All of this trade is done by truck or rail, although there are plans to build new pipelines to facilitate this process.²⁴

Natural gas is brought in via 17 pipelines, and 11 of which are on the Mexico-Texas border.²⁵

²⁰ Energy Information Administration; Petroleum & Other Liquids – Data - U.S. Exports to Mexico of Crude Oil and Petroleum Products; <http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=p&s=mttexm1&f=a>

²¹ Energy Information Administration; Natural Gas – Data - U.S. Natural Gas Pipeline Exports to Mexico; <http://www.eia.gov/dnav/ng/hist/n9132mx2a.htm>

²² Energy Information Administration; Countries – Mexico - Analysis; <http://www.eia.gov/countries/cab.cfm?fips=MX>

²³ Energy Information Administration; Natural Gas – Data – U.S. Natural Gas Imports By Point of Entry; http://www.eia.gov/dnav/ng/ng_move_poe1_a_EPG0_IRP_Mmcf_a.htm

²⁴ University of Texas at Austin; Latin American and Caribbean Program – Fuel Pipeline Will Go From Mexico to U.S.; <http://www.jsg.utexas.edu/lacp/2014/10/fuel-pipeline-will-go-from-mexico-to-u-s/>

²⁵ Energy Information Administration; Natural Gas – Data – U.S. Natural Gas Exports and Re-Exports By Point of Exit; http://www.eia.gov/dnav/ng/ng_move_poe2_a_EPG0_ENP_Mmcf_a.htm

Pipelines

Mexico has no international pipeline connections that transport crude oil. The following are the pipelines that transport natural gas from Mexico to the United States.

Table 9
Natural gas pipelines exports from Mexico the United States, by point of entry
(millions of cubic feet per year)

Location	2008	2009	2010	2011	2012	2013	2014
U.S. Natural Gas Pipeline Total Imports	3,632,403	3,299,402	3,309,747	3,119,753	2,963,140	2,786,496	2,635,858
1 Ogilby Mesa, CA	1,345	1,953	22,503	454	0	23	-
2 Otay Mesa, CA	0	0	0	1,717	0	0	0
3 Alamo, TX	20,653	13,279	4,685	0	0	0	0
4 El Paso, TX	-	-	-	-	-	-	-
5 Galvan Ranch, TX	0	245	225	501	314	1,046	1,426
6 Hidalgo, TX	1,201	284	62	0	0	0	0
7 McAllen, TX	20,115	12,535	2,520	0	0	0	0
8 Penitas, TX	-	-	-	-	-	-	-
Sub-total Imports from Mexico	43,314	28,296	29,995	2,672	314	1,069	1,426

Source: Energy Information Administration; Natural Gas data. Natural Gas exports by point of exit

Natural gas pipelines exports from Mexico to the United States do not represent an important trade category between the two countries as shown in Table 9. Natural gas is handled through eight pipelines, six of which cross the Mexico-Texas border most of them do not show activity in the last three years, with the exception of Galvan Ranch in Texas.



The following table shows exports of natural gas from the United States to Mexico.

Table 10
Natural gas pipelines exports from the United States to Mexico and Totals
(millions of cubic feet per year)

Item	2008	2009	2010	2011	2012	2013	2014
U.S. exports total	924,046	1,039,002	1,071,997	1,435,649	1,590,531	1,569,375	1,507,738
U.S. exports to Mexico	365,396	338,406	333,251	498,657	619,802	658,368	738,480
Percentages							
U.S. exports to Mexico (%)	39.54%	32.57%	31.09%	34.73%	38.97%	41.95%	48.98%

Source: Energy Information Administration; Natural Gas data. Natural Gas exports by point of exit

Over the years, natural gas exports through pipelines from the United States to Mexico have increased from close to 365,000 MMcf to close to 740,000 MMcf per year, from 2008 through 2014. The shares of these exports with respect to total natural gas pipelines exports have increased from 39.5 percent to 49.0 percent for the same period. Table 11 shows a detailed list of pipelines and volumes of natural exported from the U.S. to Mexico.

Table 11
Natural gas pipelines exports from the United States to Mexico, by point of exit
(millions of cubic feet per year)

	Location	2008	2009	2010	2011	2012	2013	2014
1	Douglas, AZ	46,437	43,953	44,470	44,836	46,069	53,679	64,072
2	Nogales, AZ	144	199	223	250	282	367	524
3	Sasabe, AZ	-	-	-	-	-	-	180
4	Calexico, CA	5,534	5,944	6,388	6,938	7,486	7,683	7,657
5	Ogilby, CA	103,540	95,394	36,683	87,259	103,050	99,468	106,856
6	Otay Mesa, CA	-	-	-	-	0	86	537
7	Alamo, TX	5,388	3,678	27,479	48,850	72,039	76,111	78,866
8	Clint, TX	84,152	89,274	87,449	96,722	101,585	108,573	138,682
9	Del Rio, TX	346	323	320	282	355	372	324
10	Eagle Pass, TX	1,695	1,237	1,471	2,114	2,970	2,608	3,801
11	El Paso, TX	7,859	7,119	7,043	7,381	6,238	5,657	4,054
12	Hidalgo, TX	0	10	0	0	2,506	9,227	14,862
13	McAllen, TX	17,400	10,935	20,627	56,569	68,425	78,000	79,396
14	Penitas, TX	18,923	4,262	1,371	6,871	0	0	0
15	Rio Bravo, TX	49,073	56,035	62,914	74,790	75,026	78,196	76,154
16	Rio Grande, TX	-	-	-	-	-	-	8,045
17	Roma, TX	24,905	20,042	36,813	65,794	133,769	138,340	154,471
	Sub-totals	365,396	338,406	333,251	498,657	619,802	658,368	738,480

Source: Energy Information Administration; Natural Gas data. Natural Gas exports by point of exit

Trucks

Data for natural gas exports from the United States to Mexico via truck is limited to volumes only, not transport by export terminal or destination. A note to consider: the average price in dollar per thousand cubic feet when transported by truck is almost three times (\$10.84) that of natural gas transported via pipeline (\$3.91).²⁶

There is no natural gas imported into the United States via truck.²⁷

Table 12
Natural gas trucked from the United States to Mexico
(million cubic feet per year)

2008	53
2009	84
2010	208
2011	236
2012	153
2013	128

Source: Energy Information Administration; U.S. Natural Gas Exports and Re-Exports by Country



²⁶ Energy Information Administration; U.S. Natural Gas Exports and Re-Exports by Country; http://www.eia.gov/dnav/ng/ng_move_expc_s1_a.htm

²⁷ Energy Information Administration; U.S. Natural Gas Imports by Country; http://www.eia.gov/dnav/ng/ng_move_imp_s1_a.htm

Ports

Mexican crude oil products are transported to the United States through Pemex Procurement International (PMI). The ports located in the vicinity of the study area are:

Mexico: Cayo Arcas, Dos Bocas, Puerto de Altamira, Puerto de Coatzacoalcos, Puerto de Tampico, Puerto de Tuxpan, Puerto de Tonalá, Puerto de Veracruz.

United States: Port of Brownsville, Port of Corpus Christi, Port of Freeport, Port of Galveston, Port Ingleside, Port Lavaca-Point Comfort, Port of Houston, Port of Texas City, Port of Sabine Neches Waterway.

Figure 5
Ports around Study Region



3. State Profiles

The core study area is focused on the economic impacts in the following states: Veracruz, Tamaulipas, Nuevo León and Coahuila. The goals of the study are to estimate the economic impacts from unconventional oil and natural gas activities on the four Mexican States and to explore the opportunities for business and economic growth in the region as a result of those activities. Recent developments in the U.S. suggest the potential impacts in Mexico could last for many years to come.

Figure 6
Study Region



Coahuila

The State of Coahuila has an area of 151,562.56 square kilometers (58,518.31 square miles), with a population of 2,748,391 inhabitants, according to the 2010 Population and Housing Census from the National Institute of Statistics and Geography (INEGI). The State consists of 38 municipalities with its capital in the City of Saltillo. The 2010 Human Development Index ranked the State at number five in the country.²⁸ In 2012, Coahuila's gross domestic product (GDP) was close to 436,096 million Mexican pesos. By the third quarter of 2014, the State had a labor force of 1,328,715 people and an employed population of 1,265,407 workers. Only 1.5 percent of those employed was hired by the extractive and electricity industries.

Coahuila is known for its industries, specifically in steel and mining. The annual production of liquid steel in 2012 was 5.4 millions of tons. The leading companies in this industry are DeAcero and AHMSA. With regard to the mining industry, Coahuila holds 95 percent of the country's coal reserves. The main companies in the extractive activity with a presence in the State are AHMSA, Peñoles, MICARE and Grupo Mexico.²⁹ Coahuila became a pioneer state in the northeast through the creation of a mineral-oil energy cluster, which includes municipal governments, universities, and private companies.

Figure 7. State of Coahuila



With respect to the creation and support of human capital, the State has 163 institutions of higher education, and 159 centers for technical education. In 2012, the State registered 4,955 engineering graduates and 13,230 manufacturing, technical education and services students. According to the *2015 Best Universities in Mexico Ranking*,³⁰ conducted by América Economía Intelligence, the Universidad Autónoma de Coahuila is placed at the 32nd position among the top 50 public and private universities in the nation. The State features five research centers with expertise in materials, polymers, metals, ceramics, agriculture, irrigation fields and water usage.

²⁸ Human Development Index in Mexico (2012): methodology and information updated for the states, UNDP, Mexico, D.F., page 6.

²⁹ Economic Development Secretary of Coahuila: www.sedec-coahuila.gob.mx

³⁰ See : www.rankings.americaeconomia.com/mejores-universidades-México-2015

Nuevo León

The State of Nuevo León has an area of 64,220.15 square kilometers (24,795.53 square miles), with a population of 4,653,458 inhabitants, according to the 2010 Population and Housing Census from INEGI, with 95 percent of this population living in urban areas and five percent living in rural areas. The Human Development Index from the United Nations Program for Development (UNPD), placed Nuevo León second after Mexico City.³¹ In 2012, Nuevo León's GDP was close to 949,244 million Mexican pesos. By the third quarter of 2014, the State had a labor force of 2,313,993 people and an employed population of 2,180,801 workers. As part of its hydrocarbon sector, Nuevo León shows a refinery located in the municipality of Cadereyta Jiménez. This is the fourth largest refinery in the country, accounting for 15.2 percent of the nation's production.³² Additionally, by 2013, the State had 6,306 kilometers (3,918 miles) of oil and gas ducts for distribution, accounting for 15.7 percent of the country's total. In 2012, Nuevo León had 73 development wells completed and four exploration wells.³³

Figure 8. State of Nuevo León



In relation to human capital, a significant segment of the State's population, 12.3 percent, has professional skills, and 1.2 percent has postgraduate education. The State has higher education institutions with national and international prestige. The previously mentioned *2015 Best Universities in Mexico Ranking* places the Instituto Tecnológico y de Estudios Superiores de Monterrey and the Universidad Autónoma de Nuevo León at numbers two and six among the top 50 private and public universities in Mexico. Nuevo León has the Parque de Investigación e Innovación Tecnológica, which is a fourth generation park based on the Triple Helix model. The strategic areas for the park are: nanotechnology, mechatronics and advanced manufacturing materials and clean energy.

31 Human Development Index in Mexico (2012): methodological and information updated for the states, UNDP, Mexico, D.F, page 9.

32 Own calculation using data from the Energy Information System, SENER.

33 An exploratory well could be a hole drilled: a) to find and produce oil or gas in an area previously considered unproductive area; b) to find a new reservoir in a known field, i.e., one previously producing oil and gas from another reservoir, or c) to extend the limit of a known oil or gas reservoir. A development well is drilled within the proved area of an oil or gas reservoir to the depth of a stratigraphic horizon known to be productive. Retrieved from: <http://www.eia.gov/tools/glossary/index.cfm?id=D>

Tamaulipas

The State of Tamaulipas is also located in the northeast part of Mexico and has an area of 80,174.68 square kilometers (30,955.62 square miles). The region has 3,268,554 inhabitants according to the 2010 Population and Housing Census from INEGI. Its capital is Ciudad Victoria. The 2010 Human Development Index ranked Tamaulipas in the tenth position in the country.³⁴ In 2012, the State's GDP was 400,892 million Mexican pesos. By the third quarter of 2014, the State had a labor force of 1,541,067 people and an employed population of 1,446,110 workers. In 2014, the *Agenda Energética de Tamaulipas* stated that 78,820 workers of the employed population were hired by the energy sector.

As part of the hydrocarbon sector in Tamaulipas, there is a refinery located in Ciudad Madero. This refinery is the sixth largest in the country, and accounts for 9.9 percent of the nation's production.³⁵ Even more, the State has five storage and distribution terminals, one marine terminal and four processing plants. The State also has 9,714 kilometers of oil and gas ducts for distribution. In 2012, Tamaulipas had five exploration wells and 171 development wells completed.

Figure 9. State of Tamaulipas



With respect to human capital, in Tamaulipas there are 51 undergraduate programs, 11 Master's degrees programs, and four Ph.D. energy-related programs offered by higher education institutions. According to the previously mentioned *2015 Ranking of the Best Universities in Mexico*, the Universidad Autónoma de Tamaulipas ranked 31st among the top 50 public and private universities in the country.

34 Human Development Index in Mexico (2012): methodological and information updated for the states, UNDP, Mexico, D.F, page 6.

35 Own calculation using data from the Energy Information System, SENER.

Veracruz

The State of Veracruz has an area of 71,820 square kilometers (27,729.86 square miles) and a population of 7,643,194 inhabitants according to the 2010 Population and Housing Census in 2010 from INEGI. The 2010 Human Development Index ranked the state in the 28th position among the 31 Mexican States and the Federal District. Veracruz consists of 210 municipalities with its capital in the City of Xalapa.

In 2012, Veracruz's GDP was 675,182 million Mexican pesos. By the third quarter of 2014, the State had a labor force of 3,230,202 people and an employed population of 3,104,982 workers. Only 0.9 percent of the population works in the extractive and electricity industries.

Figure 10. State of Veracruz



As part of the hydrocarbon sector, Veracruz has a refinery located in the Town of Minatitlán. This refinery is the fifth largest in the country,³⁶ accounting for 15.2 percent of the nation's production. The State has 9,730 km (6,045 miles) of oil and gas ducts for distribution. In 2012, Veracruz had three exploratory wells and 479 development wells completed.

In regards to human capital, the previously mentioned *2015 Ranking of Best Universities in Mexico* placed the Universidad Veracruzana at the 15th position among the top 50 public and private universities.

36 Anuario Estadístico de Veracruz 2013, p. 162.

Table 13
Key Facts for Study's States
(Mexican States)

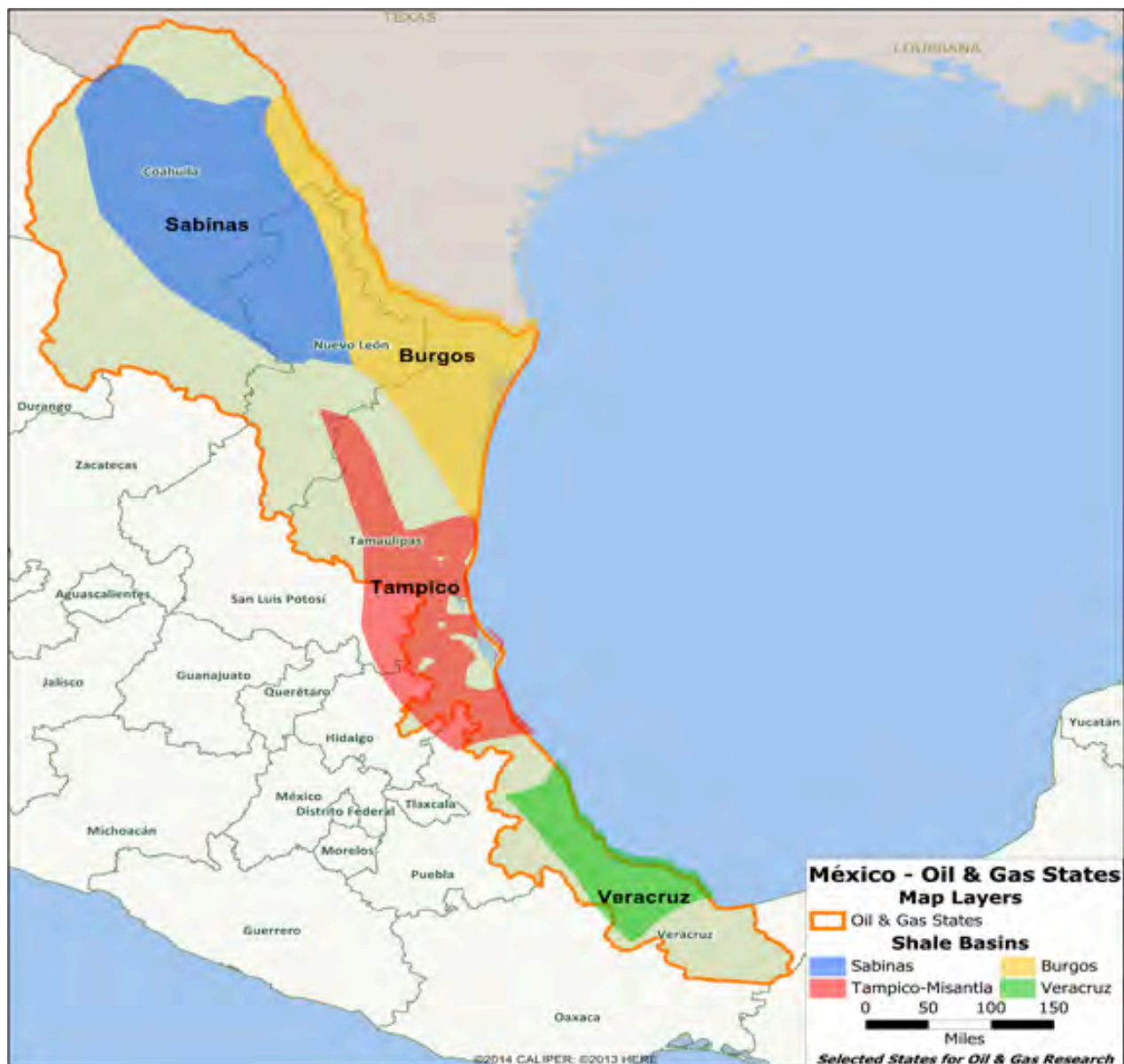
	Coahuila	Nuevo León	Tamaulipas	Veracruz
Population				
INEGI Census 2010	2,748,391	4,653,458	3,268,554	7,643,194
Land Area (Km²)				
Land Area (Sq. Miles)	151,562.56	64,220.15	80,174.68	71,820
	58,518.31	24,795.53	30,955.62	27,729.86
Amount of Municipalities and Capital	38	51	43	210
	Saltillo	Monterrey	Ciudad Victoria	Xalapa
Human Development Index (2012)	5 th position	2 nd position	10 th position	28 th position
Hydrocarbon Infrastructure	It has 95 percent of the national coal reserves.	A refinery is located in the municipality of Cadereyta Jiménez, accounts for 15.2 percent of national production.	A refinery located in the municipality of Ciudad Madero, accounts for 9.9 percent of national production.	A refinery located in the municipality of Minatitlán, accounts for 15.2 percent of national production.
Development wells completed*	2	73	171	479
Exploration wells (2012)*	6	4	5	3

*See footnote 33

4. Basin Profiles

Mexico has great potential for developing its oil resources and shale gas found in source-rock, and marine-deposited shales stored along the onshore Gulf of Mexico region. A 2013 study by the Energy Information Administration (EIA) suggests that Mexico counts with technically recoverable shale resources, estimated at 545 Tcf of natural gas and 13.1 billion barrels of oil and condensate that are potentially larger than the country's proven conventional reserves.

Figure 11
Study Region's Basins



Mexico's best documented play is the Burgos Basin, where oil and gas production extends from the State of Texas into the northern part of this country. In this basin, Mexico has an estimated 393 Tcf and 6.3 billion barrels of technically recoverable shale gas and shale oil resource potential.³⁷ However, the shale geology further to the south and east of Mexico becomes structurally complex and its development potential is less certain. The Sabinas Basin, for example, has an estimated 124 Tcf of technically recoverable shale gas resources within the Eagle Ford and La Casita shales, but the basin is faulted and folded.³⁸ Then, Tampico, Tuxpan, and Veracruz basins are structurally more favorable. These basins add another 28 Tcf and 6.8 billion barrels of technically recoverable shale gas and shale oil potential from Cretaceous and Jurassic marine shales.³⁹ It is important to note that shale drilling has not yet occurred in these southern basins. Table 14 shows the exploratory wells for shale oil and gas in the basins located in the core study area.

Table 14
Exploratory completed wells for shale oil and gas

Well	Depth (ms)	Date completion (month/year)	State	Outcome
EMERGENTE-1	4,071	2/11	Coahuila	Commercial production of dry gas
PERCUTOR-1	3,436	3/12	Coahuila	Commercial production of dry gas
HABANO-1	3,770	4/12	Coahuila	Commercial production of condensates and gas
MONTANES-1	3,200	4/12	Coahuila	Non-commercial production of dry gas
NOMADA-1	2,850	6/12	Coahuila	Non-productive
ARBOLERO-1	4,007	7/12	Nuevo León	Commercial production of dry gas
ANHELIDO-1	3,945	12/12	Tamaulipas	Commercial production of oil and gas
CHUCLA-1	3,705	3/13	Coahuila	Commercial production of condensates and gas
DURIAN-1	4,250	7/13	Nuevo León	Commercial production of dry gas
NUNCIO-1	4,900	11/13	Tamaulipas	Commercial production of dry gas
TANGRAM-1	4,426	12/13	Nuevo León	Commercial production of dry gas
GAMMA-1	3,793	12/13	Coahuila	Commercial production of condensates and gas
KERNEL-1	4,404	12/13	Nuevo León	Commercial production of dry gas
BATIAL-1	4,199	5/14	Nuevo León	Non-commercial production of dry gas
MOSQUETE-1	4,156	6/14	Tamaulipas	Non-productive
NERITA-1	4,100	8/14	Nuevo León	Non-commercial production of dry gas
CEFIRO-1	4,598	9/14	Tamaulipas	Commercial production of dry gas
SERBAL-1	4,750	1/15	Tamaulipas	Non-commercial production of wet gas

Source: Comisión Nacional de Hidrocarburos

³⁷ EIA/ARI World Shale Gas and Shale Oil Resource Assessment." (2013): II-1-1-24. Energy Information Administration. June 2013. Web.

³⁸ Ibid.

³⁹ Ibid.

The table below shows a more recent assessment of prospective resources by region. According to CNH⁴⁰ in the Tampico-Tuxpan platforms which are also known as Tampico-Misantla; Burgos Mz, Burro-Picachos, Sabinas and Veracruz it is projected that 31.9 billion barrels; 141.5 trillion cubic feet in shale gas can be extracted, together this represents 60.2 billion bbl equivalent.

Table 15
Prospective Resources according to CNH

Region	Oil and Condensates (billion barrels)	Gas (trillion cubic feet)	Crude Oil (billion bbl equivalent)
Tampico-Misantla	30.7	20.7	34.7
Burgos MZ	0	53.8	10.8
Sabinas-Burro-Picachos	0.6	67	13.9
Veracruz	0.6	0	0.8
Shale total	31.9	141.5	60.2

Source: Comisión Nacional de Hidrocarburos

Table 16 shows the estimated shale prospective resources according to the EIA, with 13.1 billion barrels of oil and condensates, and with 545 trillion cubic feet (Tcf) of natural gas. When comparing these estimates with the ones from the CNH in Mexico, in Table 15, some important differences show up. According to CNH there are more oil and condensate resources than the EIA estimated (from 13.1 to 31.9 billion barrels), with the Tampico-Misantla basin taking almost all of the gains while the Burgos basin estimates are at zero. On the other hand, gas resources are lower in the CNH than in the EIA estimates (from 545 to 141.5 Tcf) with the Burgos and Sabinas basin's losing most of the estimated resources. Still, these differences are not definitive and they would evolve over time as more exploration and production develop in these basins.

Table 16
Prospective Resources according to EIA

Region	Oil and Condensates (billion barrels)	Gas (trillion cubic feet)	Crude Oil (billion bbl equivalent)
Tampico-Misantla	6.5	24.7	11.4
Burgos MZ	6.3	393.1	85
Sabinas-Burro-Picachos	0	123.8	24.8
Veracruz	0.3	3.4	0.9
Shale total	13.1	545	122.1

Source: Comisión Nacional de Hidrocarburos

40 Mexico. CNH. Retrieved from:

http://www.cnh.gob.mx/docs/Aceite_gas_lutitas/seguimiento_a_la_exploracion_y_extraccion_de_aceite_y_gas_en_lutitas.pdf

"Prospective Resources are those quantities of petroleum estimated, as of a given date, to be potentially recoverable from undiscovered accumulations by application of future development programs." From Petroleum Resources Management Systems (2007). Society of Petroleum Engineers. Retrieved from: <http://www.spe.org/industry/docs>

Sabinas Basin

Figure 12
Sabinas Basin



The Sabinas basin is located in the northeastern part of Mexico and is one of country's largest onshore marine shale basins. It comprises part of the States of Coahuila and Nuevo León. The basin covers an area of 37,000 square kilometers according to Pemex.⁴¹ The stratigraphic column of Sabinas ranges from the Triassic to the Upper Cretaceous, deformed by the compressive forces of the Tertiary.⁴²

According to the Energy Information Administration, much of the Sabinas Basin is too structurally deformed for shale gas development, but a small area on the northeast side of the basin is more gently folded and may be prospective.

Petróleos Mexicanos began exploratory works in this area in 1962. Then by 1968 the integral drilling program was developed. As a result of the program, with the drilling of eight wells significant reservoirs were discovered. Furthermore, the production of the Sabinas Basin started in 1974 with the discovery of the Monclova-Buena Suerte field that produced non-associated gas in the Lower Cretaceous rocks. From 1974 to 2008, according to Pemex, the basin has produced 12 billion cubic feet of gas based on 23 fields discovered and 18 of those fields were still active with a remaining total reserve of 48.1 million barrels of oil equivalent. Moreover, the total prospective resource of the Sabinas Basin was estimated at 300 million barrels of oil equivalent, of which 231 million barrels of oil equivalent have been documented, which means 77 percent and 83 exploratory opportunities have been recorded. The remaining 23 percent is being documented and studied for presentation and approval.

The reservoirs in this area are fractured rocks with loose porosity and permeability. This means the reservoirs have a very high initial productivity but also a very fast decline. Moreover, the Eagle Ford Shale is distributed across the northwest, northeast, and central portions of the Sabinas Basin. The target is the 300-m thick sequence of black shales rhythmically interbedded with sandy limestone and carbonate-cemented sandstone.

Recently, Pemex drilled one shale gas exploration well in the Sabinas basin, confirming the continuation of the Eagle Ford Shale play. The Percutor-1 horizontal well, completed in March 2012, produced dry gas from a sub-surface depth of 3,330-3,390 m. According to the EIA, the well's initial production rate was a modest 2.17 million cubic feet per day with production reportedly declining rapidly.

41 "Prospective Resources as of January 1, 2008." 62.3 (2008): 11-17. Petróleos Mexicanos, 01 Jan. 2008. Web

42 Ibid.

Burgos Basin

The Burgos basin expands over an area of 70,000 square kilometers, including the continental shelf. It mainly covers the state of Tamaulipas and the oriental end of Nuevo León, directly south of the Rio Grande River (as appreciated in figure 12). The Burgos Basin is the southern extension of the Maverick Basin in Texas, the latter hosting the productive Eagle Ford and Pearsall shale plays. The basin's stratigraphic column consists of Tertiary siliclastic sediments (Paleocene to Plio-Pleistocene). Moreover, the stratigraphic column may be more than 10,000 meters thick on the eastern edge.

Figure 13
Burgos Basin



According to the EIA, based on analogy with the Eagle Ford Shale in Texas, the two most prospective shale targets in Mexico are present in the Burgos Basin. These shale targets are the Cretaceous (mainly Turonian) Eagle Ford Shale play and the Jurassic (mainly Tithonian) La Casita and Pimienta formations. The Eagle Ford Shale in Mexico is the direct extension of its commercially productive Texas equivalent. While the La Casita and Pimienta formations correlate with the productive Haynesville Shale of the East Texas Basin.

The La Casita formation is believed to be the main source rock for conventional reservoirs in the southeastern Burgos Basin, with oil transported via deep-seated normal faults.⁴³

Burgos Basin was first explored in 1942 and production started in 1945 with the discovery and development of the Misión field, near

Reynosa in Tamaulipas. Since then, according to Pemex, 227 fields have been discovered, of which 179 are currently active.⁴⁴ Moreover, there were about 3,500 active natural gas wells producing in the basin at the time. These conventional reservoirs typically have low permeability with rapidly declining gas production.⁴⁵ In 1994, the basin was reactivated with the application of new work concepts and technologies that increased the average daily production from 200 million cubic feet in 1994 to 1,400 million cubic feet in 2007. The increase meant a cumulative production of 9,536 billion cubic feet. According to the 2008 Pemex report, the remaining total reserves amounts to 959 million barrels of oil equivalent.

Recently, Pemex made its first shale discovery in the Burgos Basin in 2010. The shale gas well is located a few kilometers south at the Texas/Coahuila border on a continuation of the Eagle Ford Shale. According to the EIA, this initial horizontal well was drilled to a vertical depth of about 2,500 m and employed a 2,550-m lateral (although another source reported 1,364-m). Following a 17-stage fracture stimulation, the \$20- 25 million well tested at a modest initial rate of 2.8 million cubic feet per day (time interval not reported), which would not be profitable at current gas prices.⁴⁶

Moreover, as reported by Pemex on 2012, the Mexican oil company drilled three shale gas exploration wells in the Eagle Ford play of the Burgos basin. These wells, as reported by the EIA, include the Nómada-1 well situated in the oil window, the Habano-1 well (IP 2.771 million cubic feet per day gas with 27 bbl/day crude) and the Montañés-1 well in the wet gas window of the Burgos Basin.⁴⁷ Pemex announced drilled and produced gas from the Arbolero-1 well (3.2 million cubic feet per day), the first test of the Jurassic shale in this basin. Pemex planned to drill up to 75 shale exploration wells in the Burgos Basin by 2015.

Tampico-Misantla Basin

The Tampico-Misantla basin covers an area of 50,000 square kilometers. The area includes an offshore portion. The basin is bounded on the west by the fold-and-thrust belt of the Sierra Madre Oriental (Laramide) and on the east by the Tuxpan platform. The Tampico-Misantla Basin extends north from the Santa Ana uplift to the Tamaulipas arch north of Tampico. Then, at the northern margin of the basin is an arch that it's limited by a series of faults extending south from the Tamaulipas arch. This is Mexico's oldest oil-producing basin.

Figure 14
Tampico-Misantla Basin



43 Cuevas Leree, A., Muñoz-Cisneros, R., Silva-Saldivar, P., De la Rosa, V.H., Rivas, E.O., González, J., and Fernández-Turner, R., 2004. "A New Upper Oligocene Oil Play in Southern Burgos Basin, Mexico." Search and Discovery Article #10075, Adapted from extended abstract prepared for presentation at AAPG Annual convention, April 18-21, 2004

44 "Prospective Resources as of January 1, 2008." 62.3 (2008): 11-17. *Petróleos Mexicanos*, 01 Jan. 2008. Web.

45 EIA/ARI World Shale Gas and Shale Oil Resource Assessment." (2013): II-1-I-24. *Energy Information Administration*. June 2013. Web.

46 Ibid.

47 PEMEX, Form 6-K, U.S. Securities and Exchange Commission, November 2012, p. 7.

The principal source rock in the Tampico basin is the Upper Jurassic (Tithonian) Pimienta Shale. The Pimienta reaches shale-prospective depths of 1,400 to 3,000 m in the south where three uplifted structure occur. These uplifted structures are: Piedra de Cal, Jabonera, and Bejuco. Furthermore, near the city of Tampico, around 50 conventional wells have penetrated organic-rich shales of the Pimienta Formation at depths of about 1,000 to 3,000 m. Dry gas, wet gas, and oil occur from west to east, reflecting the gentle structural dip angle in this basin. Average shale depth in this area ranges from 5,500 to 8,000 ft.⁴⁸

In 1904 the exploratory activities started with the discovery of the Ebano-Panuco province. Up to 2008, the province has produced more than 1,000 million barrels of heavy oil. This oil comes from calcareous rocks of the Upper Cretaceous. The basin also produces carbonates in the Kimmeridgian and Lower Cretaceous in the Tamaulipas-Constituciones, San Andres and Arenque fields (the latter is an offshore field). Then, production began in 1908 in the southern part of the basin: what is now called Faja de Oro. At first, its production was obtained in the calcareous reef rocks of the Middle Cretaceous. It is important to note that Faja de Oro has both onshore and offshore portions. In these portions, sediments of the slope arising from the erosion of the reef accumulated around the edges of the reefs (known as Tamabra formation) led to the discovery of important fields such as Poza Rica, Jiliapa, and Tres Hermanos.

In the Tampico-Misantla basin, the Paleocanal of Chicontepec, which covers an area of 3,000 square kilometers, was developed to the west of Faja de Oro. The paleocanal is made up of siliclastic sediments; largely of the Paleocene and Eocene.

According to the EIA, the Pimienta Shale in the Tampico basin holds an estimated 23 Tcf and 5.5 billion barrels of technically recoverable shale gas and shale oil resources. The shale gas resource concentration averages 19 to 83 Bcf/square mile while the shale oil concentration averages 17 to 38 million bbl/square mile.⁴⁹

In 2012, Pemex reported that it was evaluating the shale geology of the Tampico basin and planned to drill several exploration wells through 2015.⁵⁰

48 Ibid.

49 Ibid.

50 PEMEX, Investor Presentation, November 2012, 43 p.

Veracruz Basin

The Veracruz Basin covers an area of 24,000 square kilometers. This area includes a shallow offshore part. The basin is asymmetric in cross section, with gravity showing the deepest part along the western margin.⁵¹ The basin comprises several major structural elements, from west to east: the Buried Tectonic Front, Homoclinal Trend, Loma Bonita Anticline, Tlacotalpan Syncline, Anton Lizardo Trend, and the highly deformed Coatzacoalcos Reentrant in the south.⁵²

Exploration started in the 1950s, and production in 1956. The basin was reactivated in the 1990s due to the need of gas reservoirs.

The sub-provinces are mainly divided into two. The first one consists of the buried structural front of the folded and faulted belt that forms the Sierra Madre Oriental, also known as the Córdoba Platform, consisting of limestone of the Upper-Middle Cretaceous that produce oil and sour, wet gas.⁵³

Figure 15
Veracruz Basin



Then there is the tertiary pit. The tertiary pit corresponds to a deposit center filled with conglomerates, sands and clay deposited as a result of the rising of the Sierra Madre Oriental and deformed by recent volcanic emplacements, with production of non-associated gas. As a result of PEP's strategy focused on the search for gas, this portion of the basin was reactivated through an intense campaign of seismic acquisition and exploratory drilling, which led to discoveries that now made it Mexico's second most important producer of non-associated gas; with a production of 1,000 million cubic feet per day in August 2007.⁵⁴

According to the 2008 Pemex report, the remaining total reserves of the basin were 268 million barrels of oil equivalent and it is currently

producing a daily average of 897 million cubic feet. As for the total prospective resource, the Veracruz Basin has 800 million barrels of oil equivalent, of which 480 million barrels of oil equivalent have been documented.

Recently, Pemex had planned to drill up to 10 shale exploration wells in the Veracruz Basin by 2016.

51 Escalera Alcocer, J.A., 2012. "Potencial de Recursos no Convencionales Asociado a Playas de Aceite y Gas de Lutitas en Mexico." ExpoForum PEMEX, August 1, 37 p. (in Spanish).

52 Prost, G. and Aranda, M., 2001. "Tectonics and Hydrocarbon Systems of the Veracruz Basin, Mexico." In C. Bartolini, R.T.

53 "Prospective Resources as of January 1, 2008." 62.3 (2008): 11-17. Petróleos Mexicanos, 01 Jan. 2008. Web.

54 "Prospective Resources as of January 1, 2008." 62.3 (2008): 11-17. Petróleos Mexicanos, 01 Jan. 2008. Web.

5. Infrastructure

Through CENAGAS and Pemex-Gas y Petroquímica Básica (PGPB), Mexico seeks investment in natural gas and petroleum infrastructure by promoting competitiveness in order to ensure a stronger industry and national economy. The objective is to encourage and actively participate in the development of projects that guarantee the domestic supply of natural gas.

In 2012, Pemex approved and implemented a comprehensive strategy that includes both commercial and investment programs in the short, medium, and long term. In the short term, imports of liquefied natural gas, in the medium and long term, increase transportation capacity of imported natural gas and a strong national gas pipeline system, which is a strategic asset for the country's development.

During the last 10 years, Mexico has experienced an increase in the demand of natural gas at a rate of 5.7 percent and 5.9 percent in the Midwestern region. For the 2012-2028 period, it is expected that domestic supply of natural gas will increase at an annual rate of 1.6 percent while market demand grows at an annual rate of 3.6 percent, while imports will grow to 3,007 million cubic feet per day (MMcfd).⁵⁵ The projects of the Strategy for Natural Gas will increase the transportation capacity of Mexico's pipeline network. For Pemex or any other participants in the natural gas market, this is a priority because no similar project has been developed in Mexico.

5-1 Pipeline Projects and Facts

This section shows some of the projects already in progress in the border between the northeast part of Mexico and the United States.

1) Agua Dulce-Frontera

The Agua Dulce-Frontera gas pipeline will supply natural gas to the Frontera-Los Ramones pipeline with a capacity of 2,100 MMcfd. Commercial operations began on Dec 1, 2014. In July 2012 PGPB, through MGI, started the contest to select the company to develop, operate, and maintain the Agua Dulce-Frontera pipeline. On January 28, 2013, the project was awarded to NET Midstream, LLC.

2) Los Ramones Phase I and II

Los Ramones phase 1 involved the construction of a 48 in-diameter and 118 km-long pipeline starting from the interconnection point of the Agua Dulce-Frontera pipeline in Camargo, Tamaulipas, bordering the US. This supplies natural gas for the Los Ramones pipeline, and culminates at Los Ramones, Nuevo León. Two compression stations at each end, with a rated capacity of 100,000 HP each, were also constructed. The pipeline under Phase I has a designed delivery capacity of 2,100 million cubic feet per day of gas (MMcfd).

⁵⁵ <http://www.gas.pemex.com/NR/rdonlyres/014D49D7-5E7A-4103-A8CA-2C5F2B11871D/0/PresentationLosRamonesPhaseI2may2013.pdf>

Los Ramones gas pipeline Phase II details

The Los Ramones pipeline is part of the Natural Gas Transport System to supply central Mexico with gas from the U.S. It will stretch for more than 620 miles and have capacity to transport 2.1 Bcf/d. System completion is slated in 2016.

Los Ramones II North will involve the installation of a 42 in-diameter gas pipeline and 450 km-long pipeline, as well as the construction of two gas compression stations with a capacity of 61,000 HP each. It is expected to generate 1,480 construction jobs and 3,000 indirect jobs. Phase II North will start from Nuevo León, traverse Tamaulipas State and end at San Luis Potosí. Its minimum delivery capacity will be 1.41 billion cubic feet per day of natural gas. The interconnection point for both sections under Phase II will be located in the Municipality of Villa Hidalgo in the state of San Luis Potosí.

The 42 in-diameter Los Ramones II South / Sur pipeline will span 291.7 km from San Luis Potosí to Apaseo El Alto, Guanajuato. This section of the pipeline will have a designed delivery capacity of 1.4 billion cubic feet per day of natural gas.

A consortium that includes Brazil's Odebrecht was awarded a \$935 million contract by Pemex to construct a portion of the Phase 2 North section of the Los Ramones pipeline. The 450-km section will run through the states of Nuevo León, Tamaulipas and San Luis Potosí and includes two pumping stations. The work will be carried out by AOT Pipelines, a consortium formed by Odebrecht, Mexico's Arendal and Argentine firm Techint.

Table 17⁵⁶
Pipeline Projects

Company	Project	Investment	Location
NET Midstream LLC	Agua Dulce – Frontera Pipeline	N/A	Agua Dulce TX to MEX-USA Interconnect Point, Border
Gasoductos de Chihuahua	Los Ramones Phase 1	N/A	MEX-USA Interconnect Point, Border to Los Ramones Nuevo León
Brazil's Odebrecht	Los Ramones Phase 2	\$985 Million	Nuevo León, Tamaulipas, San Luis Potosí, Querétaro, Guanajuato

Source: Pemex Gas y Petroquímica Básica, Diario Oficial de la Federación; Plan Sectorial de Energía

56 Mexico. DOF. Retrieved from: http://www.dof.gob.mx/nota_detalle.php?codigo=5326587&fecha=13/12/2013

Figure 16
Pipelines in Mexico

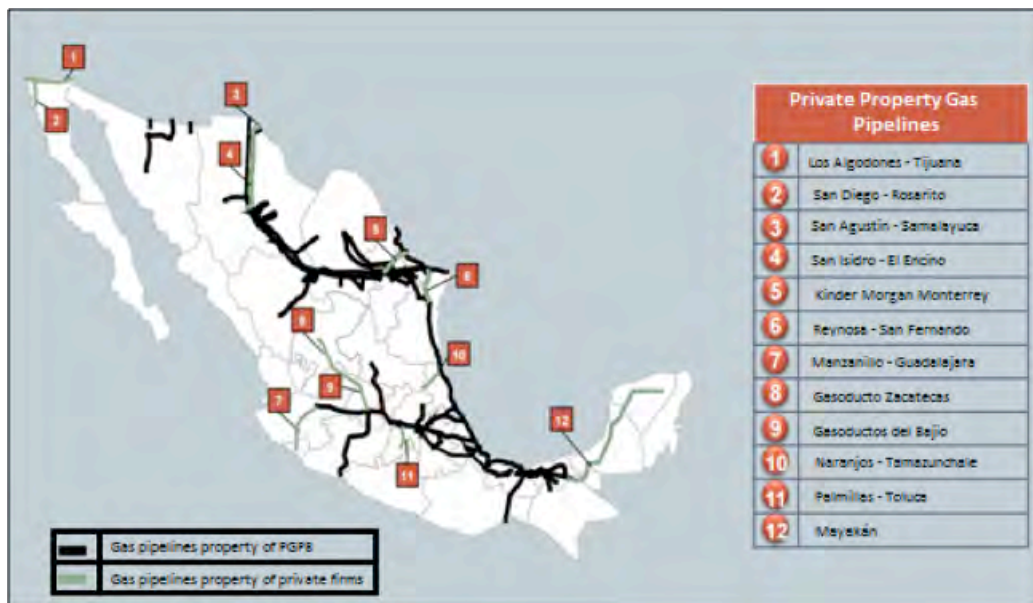


Source: CRE

Currently, the natural gas transportation network in Mexico has a length of 11,904 kilometers. Of these, 9,259 kilometers (77.8 percent) belong to Pemex-Gas and Petroquímica Básica (PGPB) and 2,645 kilometers are property of private companies (22.2 percent).

The figure below shows only the names of the private property pipelines.

Figure 17
Private Pipelines in Mexico



Source: CRE

For 2018 there are 18 natural gas transportation projects, 10,000 kilometers of additional gas pipelines, and 13.3 billion in expected investments. This is portrayed in the graph below.

Figure 18
Future Pipelines and Projects



Source: CRE

These pipelines are based on four considerations:

- To favor the natural gas supply and the construction of gas pipelines towards the center and the western part of the country.
- To support electricity demand and natural gas production scenarios before the Energy Reform.
- To maintain the supply of liquefied natural gas (LNG) by Manzanillo and Altamira until 2021 and 2027, respectively.
- Natural gas exports to Central America and the Asia-Pacific market.

6. Education and Certifications

Oil companies are well known for the extensive training all the workers must meet to keep up with the set standards the global market has evaluated as necessary. To fulfill all the requirements workers in the oil companies resort to different training companies or specialized training crews. These specialists are used in order to implement training sessions and promote new technologies and services.

An important fact that should be considered in this part of the study is that nowadays, many companies hire their own training staff as a way to reduce costs for the company, generally Human Resources takes the lead on these training sessions. Nevertheless, there are some courses that have to be taught by specialized training companies that possess special equipment and hands-on experience for the workers.

The following is a list of accredited training companies often hired by oil companies in Mexico to implement important training for the workers.

- **Grupo Planex:** <http://grupoplanex.com.mx/>
- **International Well Control Forum (IWCF):** <http://www.iwcf.org/>
- **Petrofac:** <http://www.petrofactraining.com/>
- **Felco Energy Solutions:** <http://felco-inc.com.mx/>
- **Petrogroup:** <http://petrogroupcompany.com/nuestraempresa.php>
- **VetcoGray:** the VetcoGray Capital Drilling Group offers equipment and services for onshore and offshore drilling and production.
 - o http://site.ge-energy.com/businesses/ge_oilandgas/en/our_brands/vetcogray.htm
- **Cameron:** <http://www.c-a-m.com/>
- **Baker Hughes:** <http://www.bakerhughes.com/>

It has been estimated that Mexico needs a minimum of 135,000 high-level experts, professionals and technicians in different specialties over the next four years. These experts cover the direct demand of the energy sector. Among the 135,000 direct jobs needed, close to 27,000 (20 percent) are professional, college degree jobs, and 108,000 (80 percent) are specialized technicians. Toward that end, Mexican officials have created a special program with strategic goals that creates incentives and establishes mechanisms that will coordinate the efforts of several agencies: SENER, Pemex, the Federal Commission for Electricity (CFE), and the National Council for Science and Technology (CONACYT), among others.⁵⁷

57 Programa Estratégico de Formación de Recursos Humanos en Materia Energética. SENER. Retrieved from: <http://www.energia.gob.mx/res/Prog%20Estrat.pdf>

PART TWO

Introduction

The second section of this report will introduce a preliminary *Business Roadmap, A Guide for the Operator*. The intention is to briefly describe the steps that a prospective operator in the upstream activity in Mexico will have to comply in order to expand or initiate operations in Mexico. While this roadmap has been based on the current available information, an operator could expect different and additional steps based on their interest to beginning exploration and production (E&P) activities in Mexico.

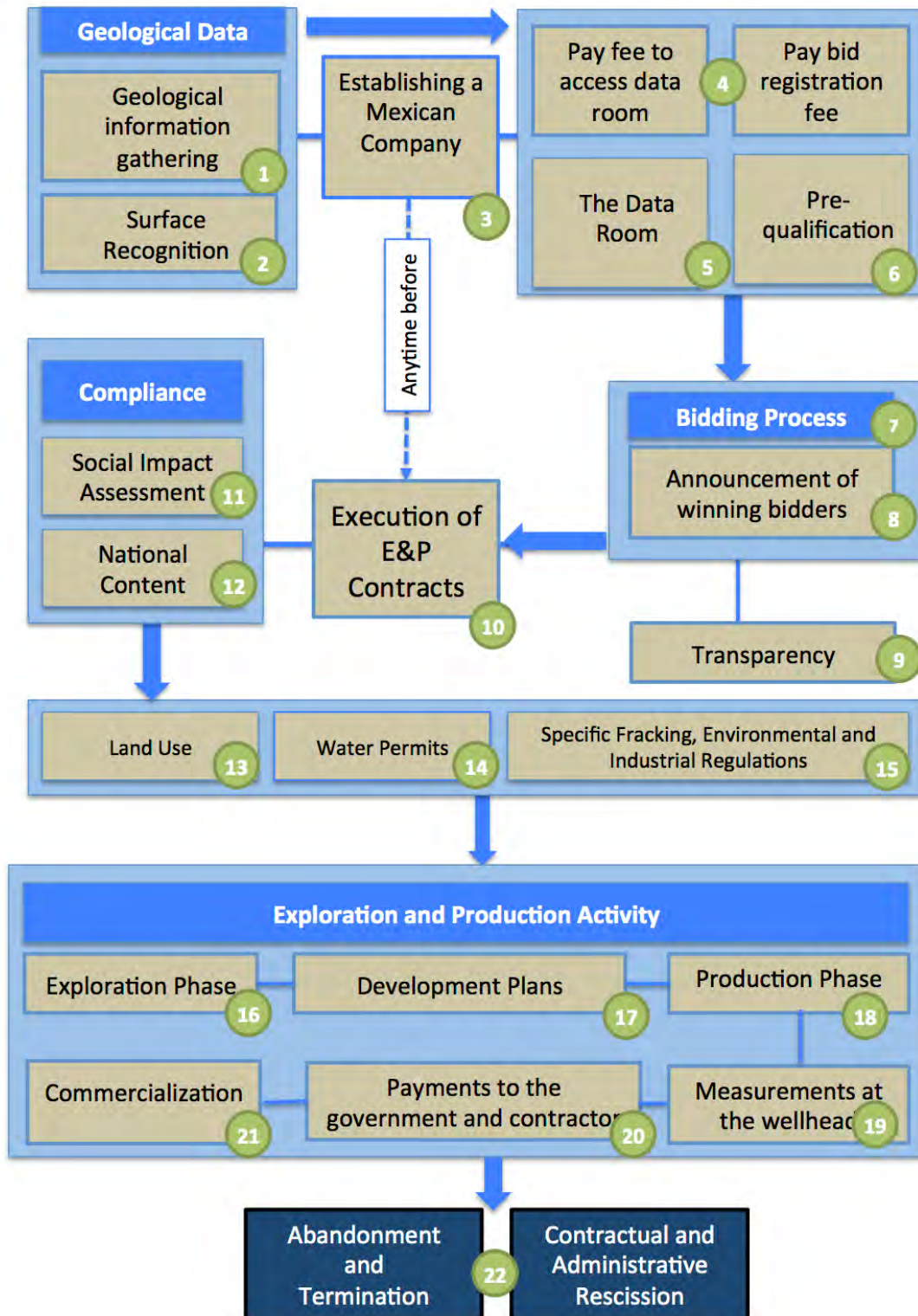
On May 11th the National Hydrocarbons Commission (“CNH”) approved during an Extraordinary Session the terms for the first tender of 26 onshore fields in Mexico. For the first time, this historical tender will open the door to private investment for exploration and production of onshore projects in fields located in five Mexican states. This tender is part of a series of five invitations to bid and the third tender for *Round One*. The first two invitations were launched for 14 exploratory fields in shallow waters and 9 blocks distributed in 5 contracts for production fields with certified reserves. This third tender for 26 blocks with production of oil and gas will be located in the following states: 5 in Chiapas; 8 in Nuevo León; 5 in Tabasco; 2 in Tamaulipas and 6 in Veracruz. Contracts will be awarded in December of 2015.

The CNH announced that these 26 blocks, ranging from 7-60 km² and with a depth of 600 to 6,900 meters, would be awarded through licensed contracts. These E&P contracts will be granted based on personal technical experience of the bidders rather than corporate qualifications. The CNH Commissioners reiterated that the terms offered in this tender should appeal to Mexican companies as well. The financial requirements to pre-qualify is a minimum of \$5 million (USD) in total assets.

For this particular tender, the access to the Data Rooms will include social impact studies and a physical visit to the blocks offered. The basis and guidelines for this third tender were published on the official website www.ronda1.gob.mx following a televised public announcement with the support of the Ministries of Finance, Energy and the CNH.

A different model of E&P contract and different pre-qualifications will be required for unconventional fields. The roadmap provided in this report is based on new legislation and complemented with information available for Round One in the first three tenders: shallow waters exploration, shallow waters production, and onshore fields.

Figure 19
Business Roadmap for the Operator



1. Geological Information Gathering

The most complete and important geological information will be offered through the Data Packs. As we will see later, companies interested will be required to pay a fee and to gain access to the Data Rooms. Each tender offered by the Mexican Government will contain geological information which will be accessible when the corresponding fee is paid. This geological information will be available in both electronic and physical formats. For current tenders in shallow waters the information available in the data pack includes: executive summary, processed 3D seismic surveys in SEGY format, documents related to the basin geology, wells information for regional correlation, wells logs in LAS, LIS and DLIS format, and a full version of Geologic Atlas.

A second level of information specific to each block offered to every tender has been made available to the public on the following website: <http://ronda1.gob.mx/English/index.html>. This website is available and frequently updated in English and Spanish. It includes information specific to each tender such as types of E&P contracts, local content requirements, and a Geological Atlas for the corresponding blocks.

A third level of geological information non-specific to the bidding rounds is available on the following websites and sources:

Sistema de Información Energética:

<http://sie.energia.gob.mx/>

Registro de Información Geológica:

<http://www.cnh.gob.mx/rig/>

2. Surface Recognition

In order to gain a better understanding of hydrocarbon reserves and potential in some specific areas, a company in Mexico can request special permits to CNH to conduct "Authorizations for Hydrocarbons Assessment and Surface Exploration" (ARES).

ARES permits are for the commercialization of the information obtained will be normally granted for 12 years and used for testing an area (land or water) for the existence of hydrocarbons. Permit activities include work for the acquisition, processing, reprocessing, and/or interpreting information. The activities may be conducted by State Productive Enterprise (SPEs), any person or entity (assignees, contractors and authorized individuals) with prior authorization under the provisions applicable to public procurement in exchange for a fee.

Authorizations to perform the assessment activities of an area, the criteria for confidentiality and the right for commercial use of the information obtained from the ARES will be carried out by the CNH.⁵⁸

CNH may grant such authorizations to applicants enrolled in the pre-registry through the following mechanisms:

- Open authorization: anyone interested with the pre-registry completed may request the study area of interest
- Contracting: components in the ARES shall include work plan, standards, assessment and analysis for all proposed activities

It is important to emphasize that authorizations are granted in accordance with the following criteria and priority resolution:

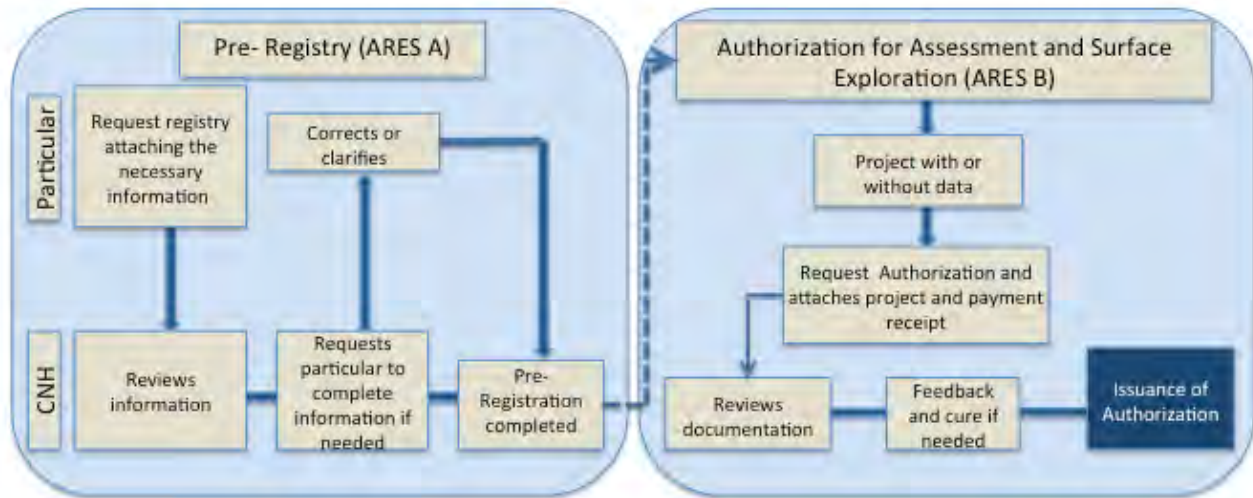
1. Compliance with the requirements of the application, work plan and financing
2. Record of compliance with previously granted authorizations and established constraints
3. The activities to be performed encourage knowledge of the country's oil potential
4. The activities undertaken promote the use of technology according to the standards of the industry's best practices

Specific authorizations do not grant *per se* exploration and preferential rights. Permits only authorize the right to commercially exploit within the scope of the provisions. This applies to all except for some assignees and contractors who do not require authorization of the assigned areas which are contractually held. These exceptions are only required to give notice to the CNH, meet delivery requirements and other obligations.

58 These elements will be defined by the LH, Regulation of the LH, administrative general provisions regarding authorizations for assessment and surface exploration of hydrocarbons, published on January 26, 2015, and amended on April 15, 2015.

Below is a summary of the procedure of pre-registry and registry for the authorization for Assessment and Surface Exploration:

Figure 20
Process for Assessment and Surface Exploration



Source: CNH⁵⁹

The information derived from ARES, which includes geological, seismic, geophysical, petrochemical and others, belong to Mexico. CNH will be the responsible agency for collection and management of such information with the National Center for Information of Hydrocarbons (CNIH). The CNIH will also manage rock cores, drill cuttings and oil samples deemed necessary for historical and prospective acquits.

It is also prohibited for assignees, contractors, authorized individuals, and government officials to post, deliver or cleave information by different means other than those covered in the hydrocarbon laws (*Ley de Hidrocarburos*, LH) or by the prior consent of CNH. It is the responsibility of those delivering the information to the CNH to ensure the quality, integrity and security of said information. Notwithstanding, the contractor will be allowed to commercially utilize such information. Additionally, CNIH information will also be available to any official who is part of SENER and SHCP. Universities and research centers will have access through an agreement with CNH.

59 ARES Webpage. Retrieved from: <http://cnh.gob.mx/ares.aspx>

3. Establishing a Mexican Company

Domestic and foreign companies are able to participate in all phases of the bidding round. However, upon selection of a winning bidder, the CNH may only execute exploration and production contracts with Mexican-incorporated commercial entities, meaning that winning bidders that have not previously established a Mexican corporation or other Mexican entity will need to do so at that time.

There are three ways in which these companies can do business in the country. The first option is to conduct its business through an agent or representative in the country; the second is through a Mexican branch of the company and the third option is through the creation of a company incorporated under the Mexican law. For this study, we will focus on the steps that must be followed by the foreign companies to establish a Mexican subsidiary.

In order to facilitate the opening of new businesses, the Federal Government created an official website, www.gob.mx, which includes all the procedures that exist in the country in one place. Within this site, there is a link to www.tuempresa.gob.mx, a website where the operator enters information on each of the necessary procedures for the creation of a company. The use of this site is optional, since the formalities can be made in person.

Federal laws apply nationally for all states, however local laws may vary. The steps described below will apply to any city in which the operator chooses to constitute their new Mexican company.

The first step requires the authorization from the *Secretaría de Economía*, SE, for a company name. This application may be submitted through www.tuempresa.gob.mx, or in person at the headquarters or offices located throughout the states. The estimated time is one day for the application, two days for resolution by the corresponding authority and 180 calendar days after the date of the authorization.

The second step is the development and protocolization of the corporate charter by the Notary Public chosen by the operator. For this procedure it is necessary to choose partners and the type of company. The LGSM recognizes six different types of companies in Mexico. However, the most common and recommended to foreign investors are:

1. *Sociedad de Responsabilidad Limitada (S. de R.L.)* or Limited Liability Company, with the possibility of being variable capital (*S. de R.L. de C.V.*) This type of partnership is formed by partners who are only obligated to pay their contributions represented by interests.
2. *Sociedad Anónima (S.A.)* or Limited Liability Company, with the possibility of being variable capital (*S.A. de C.V.*) This type of partnership is formed by shareholders whose liability is limited to the payment of their shares.



3. *Sociedad Anónima Promotora de Inversión (S.A.P.I)*, or Limited Liability Company Promoting Investment, with the possibility of being variable capital (*S.A.P.I. de C.V.*). This type of company offers more flexibility to its shareholders to establish rules regarding the shares of the company.
4. *Sociedad Anónima Bursátil (S.A.B.)*, Stock Market Limited Company, with the possibility of being variable capital (*S.A.B. de C.V.*). This type of company has the distinction of issuing shares in the BMV.

After choosing the type of company, the company bylaws are established. The next process is the registration of incorporation in the *Registro Público de Comercio (RPC)*. This procedure is intended to publicize the act of incorporation and is performed by the Notary Public. The approximate time is five days, but this may vary depending on how long it takes the operator to choose the type of company and the RPC workload. The company must pay rights to the RPC plus notary fees.

The third step is to obtain the RFC before the SAT.⁶⁰ This procedure can be initiated through www.tuempresa.gob.mx but is finalized at the nearest SAT office. The approximate time for this procedure is two days from the online request to the SAT office appointment. The most efficient option would be to register with the SAT through remote means as the notary is part of the agreement with the Ministry of Finance.

The fourth step is to register the trademark of the company before the IMPI.⁶¹ This is an online process through www.tuempresa.gob.mx and authorization is required. This may take up to nine months, so it is necessary to save the application. You must also pay for internet rights for the brand.

⁶⁰ For more information: www.sat.gob.mx

⁶¹ For more information: www.marcenet.impi.gob.mx

The fifth step is registration with the IMSS.⁶² It is mandatory to register all employees under social insurance. This can be done by pre-registry at www.tuempresa.gob.mx and then going to the IMSS administrative sub-delegation where the employer enrollment and registration is obtained. This procedure takes about one day and it is free.

The sixth step is the registration with the RNIE.⁶³ It must be filed within 40 working days from the date in which the company was formed. This registration includes the presentation of different notices regarding the company's change of name, address, activity and ownership structure, as well as the Annual Economic Report and Quarterly Reports. All these procedures are carried out through the portal of the RNIE.

Subsequent steps depend on each state or municipality where the company is located. All steps must be completed in order to avoid possible penalties resulting from failure to submit reports, notices or renewal of permits.

Furthermore, in order for a company, to have workers from abroad, there is an application for employers that needs to be obtain from the National Migration Institute,⁶⁴ as well as a working visa for each foreign contract workers.

⁶² For more information: <http://www.imss.gob.mx/tramites>

⁶³ For more information: www.rnie.economia.gob.mx

⁶⁴ For more information: www.inm.gob.mx

4. Pay Fee to Access Data Room and Bid Registration Fee

Once the bidding guidelines have been published by the Bidding Committee, and blocks and fields have been announced, the operator will begin the bidding process by paying the corresponding fee to enter to the data room in order to obtain all the required information to assess its interest for a specific contractual area for E&P.

First, the interested companies have to request access for information in the Data Room using the form *CNH-1 Solicitud de Acceso a la Información del Cuarto de Datos*, following the detailed process in topic six (inside this document).

After completing this request, the companies have to pay a fee for the data room and registration for the bidding. This registration consists of two payments at SHCP authorized banks using the format *e5cinco* for the following amounts:

- For bid registration, skills assessment, tendering and resolution for contracts for exploration and extraction of hydrocarbons, MXN 280,000.
- For data room access and technical support for viewing and downloading data relating to the contract areas:
 - For exploration and extraction of hydrocarbons on shallow waters, MXN 5,300,000.
 - For extraction of hydrocarbons on terrestrial fields, MXN 2,500,000.

After making the registration payment, companies will be issued an identifying code (*Clave AD*). Please note that it is not necessary to have completed the pre-qualification process to have access to the data room.

5. The Data Room

The Data Room is a site that stores and distributes digital information related to the contractual tendered areas. Access to the digital information from the Data Room will be given to those companies involved in the exploration and/or extraction of hydrocarbons. Interested companies must first request access to the Data Room using the CNH-1 Request for Access to Data Room Info form. Such request shall be accompanied by the following documents:

1. A document certifying the legal existence of the company
2. A document certifying participation in exploration and/or extraction activities
3. A certified copy of the official identification of the legal representative and a certified copy of the power of attorney for acts of administration or specific to participate in the bidding process. Certified official identification and copies of the power of attorney may be submitted by: a) certification of a Notary Public abroad with powers to carry out such certification, b) certified copy by a Mexican notary, c) apostilled or legalized copy in the country of origin
4. CNH-2 Confidentiality Agreement signed by the legal representative

Once the referred documents have been sent to CNH, the company will receive an email with the AD key authorization or in some cases, the denial for the access to the information in the Data Room.

The second step requires the company to make the corresponding payment at the SHCP authorized banks using the *e5cinco* format (See item 4 of this guide). The payment for access to the Data Room information will allow the interested company to obtain the following:

1. A hard drive that contains the technical information held in the Data Room of all areas considered contractually tendered
2. Visits scheduled to the physical data room
3. Virtual access to the website of the Data Room, which displays information contained in the hard drive and the physical data room
4. Physical visits to the contractual areas exclusively for onshore fields

As a last step, the company must send a copy of payment proof to the CNH and setup an appointment to pick up the hard drive at the CNH. On the day of the appointment, the company representative must submit the original proof of payment and will receive the hard drive password. Interested companies that have paid access to information in the Data Room will be the only ones who may participate in the bidding process (See the following website: <http://ronda1.gob.mx>).

6. Pre-Qualification

After making the payments for the Data Room interested parties must prequalify in order to be able to submit the proposal. The CNH will publish the list of the technical, operational, financial and legal documentation necessary for the pre-qualification process.⁶⁵ The supporting documentation for the pre-qualification process must be submitted in person at the time of a previously scheduled appointment with the CNH. The bidding committee will then review the documentation at the time of submittal. If some documents are missing, the company will have to request another appointment to submit all required supporting documents. The documents must be delivered in two different folders, one containing the technical, financial and legal documentation and the other containing the supporting documentation. The following table depicts an example of such guidelines for the ongoing shallow water tender.

Table 18
Criteria and Documentation needed for Pre-qualification

EXPERIENCE AND TECHNICAL AND EXECUTION CAPABILITIES	CRITERIA FOR EVALUATION	DOCUMENTATION
	1) Experience as an Operator during the period 2010-2014: (a) at least three exploration and extraction projects, or (b) capital investments in exploration and extraction projects of at least one billion dollars in the aggregate	<ul style="list-style-type: none"> • Certified copies of agreements, concession titles, or hydrocarbon exploration and extraction contracts • If its securities are traded on a stock exchange, submit its annual report or certified financial statements
	2) Experience as an operator or partner in offshore projects in the past five years	<ul style="list-style-type: none"> • Certified copies of agreements, concession titles, or hydrocarbon exploration and extraction contracts
	3) Personnel in key management positions with the required capabilities	<ul style="list-style-type: none"> • Curriculum Vitae of personnel showing that they have a minimum of 10-years of experience in managing exploration and extraction terrestrial or maritime projects
	4) Must demonstrate experience in the areas of industrial safety and environmental protection during the past five years.	<ul style="list-style-type: none"> • The bidder's management system for industrial safety and environmental protection, together with an opinion issued by a specialized international firm that confirms the international practices in the operation of exploration and extraction projects
FINANCIAL CAPABILITIES	1) Must demonstrate that it has total assets of: <ul style="list-style-type: none"> • At least ten billion dollars for shallow waters • At least 5 million dollars for type 1 terrestrial areas • At least 200 million dollars for type 2 terrestrial areas 	<ul style="list-style-type: none"> • If its securities are traded on a stock exchange, submit its annual report • Submit financial statements, certified by an independent internationally recognized auditing firm through which evidence is provided to substantiate the total amount of assets required.
	2) Must demonstrate that it has an investment grade credit rating	<ul style="list-style-type: none"> • The credit rating document must be issued by any of the following credit rating agencies: Fitch Ratings, Moody's Investors Service, or Standard and Poor's Rating Services.
	3) Must demonstrate that it has sufficient net worth	<ul style="list-style-type: none"> • If its securities are traded on a stock exchange, submit its annual report • Submit financial statements, certified by an independent internationally recognized auditing firm, through which evidence to substantiate the required net worth will be provided
LEGAL DOCUMENTS	1) Must demonstrate the legal incorporation of the company	<ul style="list-style-type: none"> • Certified incorporation charter. • Bylaws • Legal representative information • Supporting documentation, among others
SOURCE OF FUNDS	1) Must demonstrate that the financial resources available to it have been obtained legally	<ul style="list-style-type: none"> • Source of funds held • Corporate ownership and management structure • Tax returns • Audited financial statements

⁶⁵ It is important to note that each bidding round is expected to have different pre-qualification requirements and the CNH has just published the requirements relating the shallow water and onshore fields bidding process. Source: www.ronda1.gob.mx

7. Bidding Process

According to the Mexican Constitution, the CNH should prepare the bids, announce winners and execute E&P contracts⁶⁶ with the awarded operators or consortiums. Additionally, the CNH will be in charge of designing and supervising technical aspects of the tendering of the blocks for E&P contracts. On November 28, 2014 the CNH published in the DOF the guidelines for the first tender of Round One for shallow waters.

The acts and phases of the tender will be developed under the principles of economy, competitiveness, simplicity, speed, efficiency, legality, industry best practices, transparency, impartiality, equality and good faith. The tender shall not establish requirements that have the effect of limiting the principles of free competition. Acts related to the process of bidding and awarding of contracts for the exploration and extraction are considered public activities. The CNH may establish basis in the steps or mechanisms considered necessary to promote optimal competition among participants, taking into account the size, complexity and nature of each bidding round.

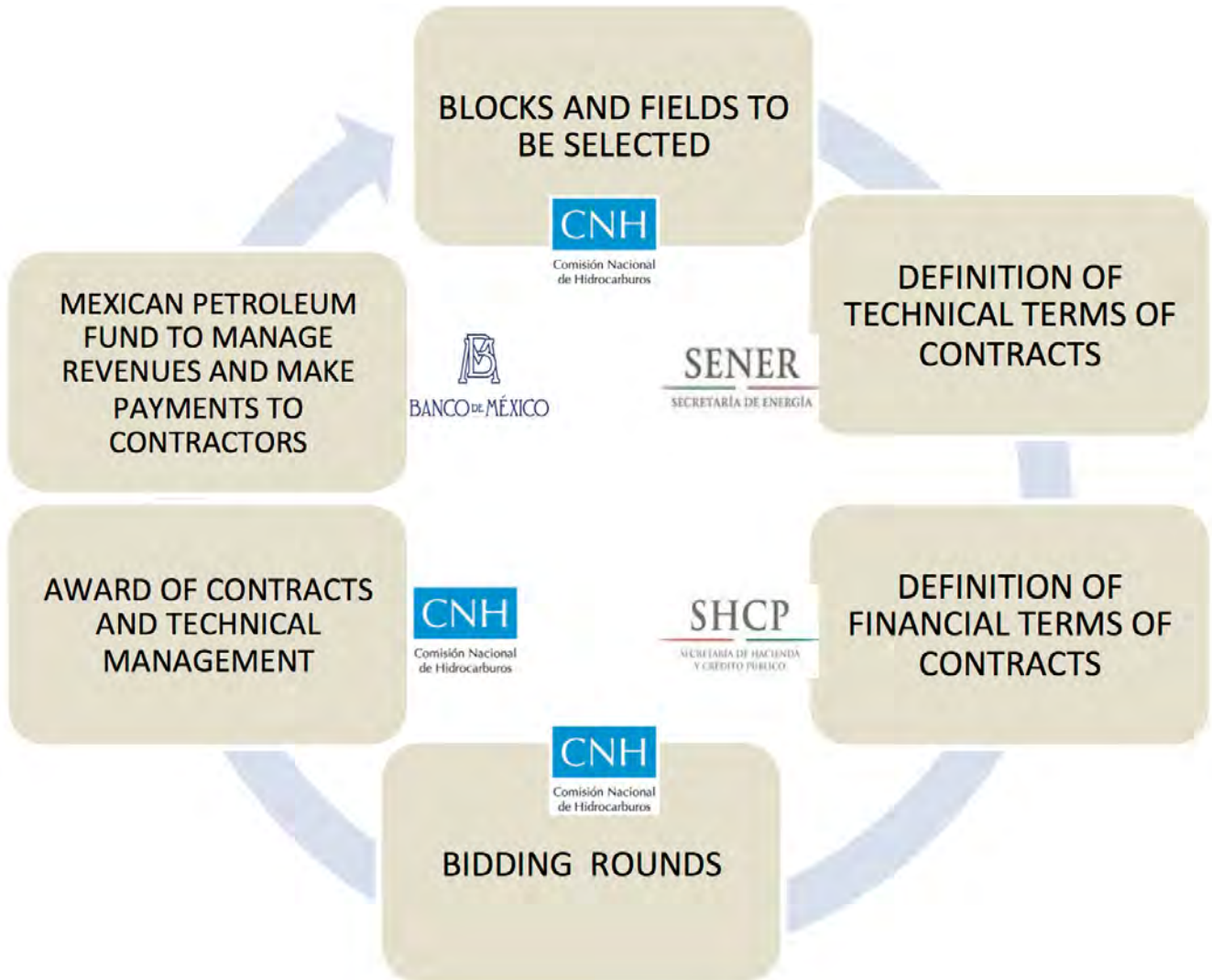
Each bidding round will include of the following phases:

- Publication in the National Journal of the Federation of the specific fields to be tendered that shall be selected by CNH. SHCP will define financial terms and SENER will determine technical conditions (See table 21 supra)
- Access request to the data room via regular mail by sending all the required information
- Application will be reviewed and if approved, a unique AD Code will be generated and sent via email to the operators authorized
- Pay access for the contractual areas data pack
- Enter Data Room and collect the Data Pack information
- Present all the pre-qualification documents
- Bid submission by interested parties
- Opening session and announcement of winning bidders by CNH
- Award decision and publication in the DOF

⁶⁶ In Mexico Exploration and Production (E&P) Contracts are known as *Exploration and Extraction (E&E) Contracts*

Figure 21 depicts the bidding process and federal agencies involved in each one of the corresponding steps.

FIGURE 21
Bidding Process and Agencies Involved



7-1 The Bidding Committee

The tender committee shall coordinate and implement the various stages of the bid which will include reviewing, checking, and confirming that all documentation received during the tender process complies with the established criteria.

The bidding guidelines shall include the following information:

- The object, timing and process of the tender
- Contractual area to be tendered
- Requests for clarifications
- Possible and expected amendments to the bidding
- Required pre-qualification criteria and documentation
- Fiscal and financial conditions relating to fiscal terms
- Local content requirement
- Criteria for determining the bid winner
- Format in which proposals must be submitted along with specific requirements for submitting joint proposals
- Proposed model for E&P contract(s) for the respective tendered blocks
- Minimum working program for each contract area
- Foreseeable modifications to the conditions of the tender
- Rules of confidentiality
- Collateral requirements

All information should be made available adhering to the established as published in the DOF and on the corresponding websites.⁶⁷

⁶⁷ For Current tender (Round One) the website offering all available information for the each tender is <http://ronda1.gob.mx/English/index.html/>. Information available in English and Spanish.

8. Announcements of Winning Bidders

The CNH will announce the winning bid contract for exploration and production which shall contain the following:

1. Results of tender and proposals rejection
2. Name of first place bid winner
3. Name of second place bidder
4. Deadline for signing the contract and the presentation of guarantees

If the bid is declared void with respect of one or more proposals, the judgment shall state the reasons behind such declaration. In any case, the nullity or disqualification shall not include proprietary or confidential information. The CNH may also revoke the decision if it appears that the bid winner submitted false information.

The Commission may null all or part of the tender process when:

1. No proposals were submitted in the bidding process
2. Participants do not meet the requirements requested to pre-qualify
3. The economic proposals are not acceptable

Prior to the signing of the contract, the bidder shall submit the information and documents described in each bidding process such as guarantees, charters, powers, proof of address, and proof of compliance with tax obligations among others.

In conjunction with the execution of the contract, the winning bidder must deliver to the CNH the following documents relative to the contractual Mexican entity:

- Incorporation charter
- Powers of attorney of its legal representative
- Other tax and corporate information as further described in the bidding guidelines

9. Transparency

The Hydrocarbon Law (LH) has a specific section regarding anticorruption and transparency stating that any party (private or public) who conducts "corrupt acts," defined later on, shall be punished. It is important to mention that the corrupt acts will terminate assignments, E&P contracts, permits, and authorizations respectively.

These procedures should be governed by the principles of transparency, maximum publicity, equality, competitiveness and simplicity. The authorities responsible for any transaction in relation to E&P contracts or assignments must comply at all times to the principles of economy, efficiency, effectiveness, fairness, honesty, objectivity and transparency.

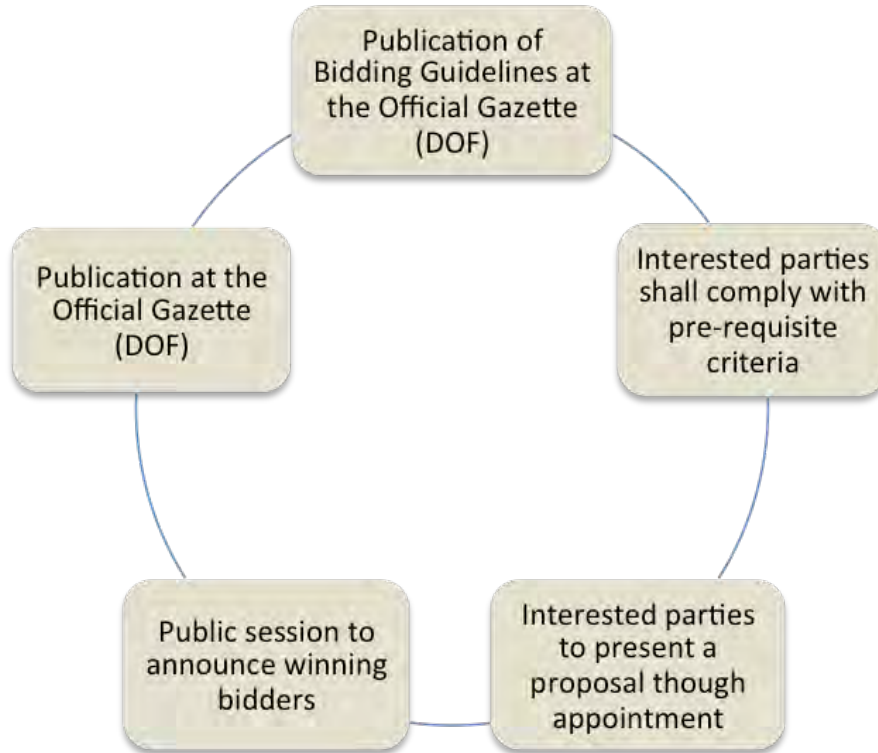
The LH provides a series of mechanisms to be implemented in all bidding procedures. The objective of these mechanisms are to grant the best conditions for the state while ensuring the rights, legal certainty and equal conditions for all parties interested in investing and doing business within the energy sector.

SENER, CNH and the CRE are responsible for making publicly available, on a monthly basis, the following information: data about assignments, permits, and areas to compete for contracts for exploration and extraction. CNH shall publish the results, statistics, bases and rules of the bidding processes for contracts, existing authorizations, and volume of hydrocarbon production as well as technical information related to the management and supervision of contracts. The CRE must publish information on current permits, volume of natural gas transported and stored, along with used and available capacity in the facilities and pipelines. Additionally, oil and gas, natural statistics, and petrochemical results of the activities of the managers of Integrated Systems must also be published.

Like the government agencies, assignees, contractors, licensees and authorized individuals are required to deliver, in a timely manner, the information required for the publication referred to in the previous paragraph, through the corresponding websites created to that effect. It is worth mentioning that the information must be published in a way that facilitates its use and understanding by taking advantage of electronic media and information technologies.

Another mechanism to ensure transparency, is the acc Specifically regarding the award of contracts through the tender process, carried out by the CNH, a mechanism to ensure transparency is provided below:

Figure 22
Transparency Process



Another mechanism to ensure transparency, is the access to public information prior to the granting of a contract, entitlement or the publication guidelines for bidding rounds. SENER in coordination with the Ministry of Interior, SEGOB must prepare a social impact study regarding the area under the assignment or contract. SENER must make available to the participants the results of this study as well as information of vulnerable social groups in bidding areas, so that the necessary actions to safeguard their rights are implemented.

During the first two years from the approval of the LH and with the purpose of preparing information offered in the data rooms, the CNIH, SENER and CNH may sub-contract necessary services (legal, economic, geological, etc.) for the implementation of the bidding process for E&P contracts. These will only be awarded by inviting at least three entities or by direct award, and will not be subjected to the public bidding process.

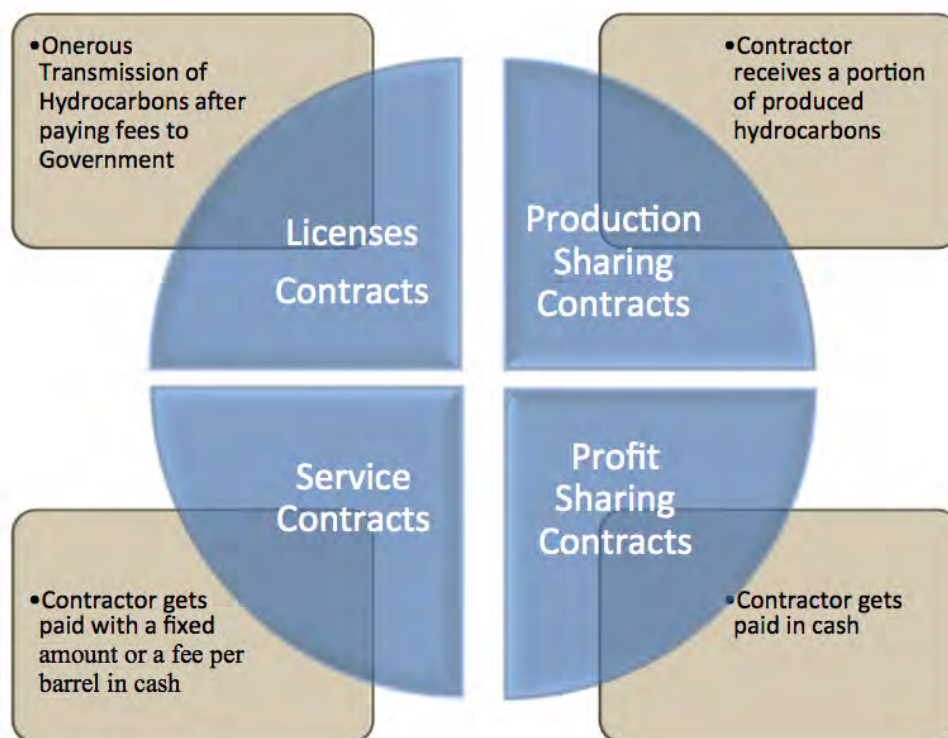
To avoid corrupt practices, the LH established a public code of conduct for public officials of the SENER and ASEA. The LH also created sanctions regarding the behavior of public officials as well as individuals and corporations, domestic or foreign, involved in the contracting and permitting process. A breach of these provisions may be grounds for termination of assignments, contracts, permits and respective authorizations.

Some of the prohibited actions are the acceptance of gifts, travel expenses, financial contributions of any kind, as well as other valuable consideration offered to a public official or a third party in any way that interferes in one or more of the acts in the procurement procedure.

10. Execution of Exploration and Production Contracts

The Hydrocarbons Law (LH) and the Hydrocarbons Revenue Law (LIH) govern all activities related to the hydrocarbons industry within national territory and are regulated by commercial and civil law. The laws specify that all hydrocarbons in the subsoil belong to the Mexican State. However, the laws allow the federal government rights to explore and extract through entitlements to PEMEX, other SPEs, and private companies through E&P contracts. Generally, these contracts are awarded through public bidding processes. Another important point to note is that PEMEX can participate as a contractor and not as assignee under this new regime of contracts. The new contract models for E&P are: license contracts, production-sharing contracts, profit-sharing contracts and service contracts. Section 17 of this report will provide detailed information on economic and fiscal terms of the E&P contracts. The following figure provides information on the type of contracts authorized by the new legislation and the kind of payment that the contractor will receive from the government.

Figure 23
E&P Contracts



Contracts for E&P require payments to the Mexican Government in the form of compensations, taxes, and fees. The LIH provides various formulas for the determination of the consideration to be paid by the contractors. The model of the contract will depend on the conditions of each fields offered. The SHCP will determine the economic conditions relating to fiscal terms to be contained in contracts that are allocated by tender or by migration process, as appropriate. A public tender is also necessary to award contracts for the E&P of natural gas associated with carbon mines. Exceptionally, the contracts may be directly awarded to holders of mining concessions exclusively for the E&P of natural gas contained in and produced by mineral carbon seam. If hydrocarbons are not associated with the mineral carbon, the contract for their production shall be awarded through a bidding process.

Contracts for E&P are governed by Mexican federal law. The parties will resolve their disputes through arbitration (except for administrative rescission). CNH may rescind contracts for serious reasons and following a mechanism established within the E&P contract to eventually recover the contractual area. Once the contractor has been notified of the governmental intention to rescind the contract, the operator will be given the option to cure rescinding the contract. Contractors may report the reserves for accounting and financial effects and expected benefits provided it is expressly mentioned that hydrocarbons underground are owned by the Mexico.

It is important to keep in mind that the bidding guidelines for E&P contracts may include a share of the Mexican state through PEMEX and any other SPEs in the following cases:

1. When the contract tendered area coexist, at different depths, with an area of the assignment
2. Where there are opportunities to promote the transfer of knowledge and technology for the development of the resources of Pemex or any other SPEs
3. In the case of projects that will be performed through a specialized financial vehicle of the Mexican state

In those cases, PEMEX involvement may not exceed 30% of the project investment. SENER, with the technical assistance of the CNH, may establish a mandatory participation of PEMEX in those areas where there is a possibility of finding trans-boundary reservoirs. In that case, the mandatory participation of PEMEX will be at least 20% of the project investment.

The CNH may only execute E&P contracts with Mexican-incorporated entities that meet the following criteria:

- The contractor is a tax resident of Mexico
- The entity's corporate purpose is exclusively the exploration and production of hydrocarbons
- The entity is not subject to the optional consolidation tax regime

The current contract models that have been proposed for the blocks offered in shallow waters and mature fields or onshore are Production Sharing Contract⁶⁸ (PSC) and Licenses Contracts⁶⁹. The following sections will present an overview of these contracts utilized by the Mexican Government for the fields that have been tendered in shallow waters and onshore.

⁶⁸ Announced and published for the first time in December of 2014 at the DOF

⁶⁹ Announced and published in May of 2015 at the DOF

10-1 Production sharing Contracts for shallow waters (exploration and production)

Under the Production Sharing Contracts, offered in December of 2014 and February of 2015, the operator will develop E&P activities within the contractual area and will cover all costs and risks associated based on the best industrial practices and contractual terms. The contractual party will receive in exchange the corresponding payment established in the contract that should be a portion of the hydrocarbons production. These contracts will be valid for 25 years, and it will be possible to extend its validity for up to ten years in two five-year terms.

All bidders must demonstrate that they have technical and financial capabilities. Each winning bidder must deliver to the CNH a corporate guarantee and a performance guarantee. The corporate guarantee must be granted with the purpose of guaranteeing all obligations under the contract, including all payments to the state. The contract specifies that a letter of corporate guarantee be requested of the contractor as well as an unconditional and irrevocable letter of credit issued to for benefit of the Mexican Petroleum Fund.

10-2 License Contracts for Onshore Fields

On May 11, 2015 during an Extraordinary Session, the CNH approved the terms for the first tender of 26 onshore fields in Mexico. This historical tender opened the door for private investment in exploration and production onshore projects located in five Mexican states.

For onshore fields, Mexican authorities decided to utilize the license contract model through a simplified process. The contractor will be able to avoid excessive governmental control as is expected to occur in PSC. Additionally, they have presented more accessible conditions to promote participation of Mexican industry in the hydrocarbons sector. Access to the Data Room will be also less expensive than the shallow waters data room (see *supra* table 19), and will include a social impact assessment and a physical visit to the actual blocks offered. Additionally, national content goals will be superior to block offered in shallow waters, and have increased the goal to 38% of local content by 2025.

Financial and technical conditions have been simplified. These conditions will assess at personal experience rather than corporate qualifications.

The following table offers comparative aspects of the three tenders including contract terms and bidding guidelines presented by the Mexican Government as part of the ongoing bidding round.

Table 19
Comparative Aspects of the first three tenders of Round One

Terms	Shallow Waters (Exploration)	Shallow Waters (Production)	Onshore (Mature fields)
Expected Investment	US \$ 16,760 M Next 5 years	US \$ 4,480 M Next 3 years	N/A
Expected jobs	45,000 direct jobs	12,000 direct jobs	N/A
Bidding Invitation	December 11 th 2014	February 27 th , 2015	May 12 th , 2015
Data Room	January 2015	February 27 th , 2015	June 1 st , 2015
Opening of Proposals	July 15 th , 2015	September 30 th , 2015	December 15 th , 2015
Blocks	14 Blocks / 14 Contracts	9 Blocks / 5 Contracts	26 Blocks / 26 contracts
States within each area	Coasts of Veracruz, Tabasco and Campeche	Coasts of Tabasco and Campeche	Chiapas, 5 blocks Nuevo León, 8 blocks Tabasco, 5 blocks Tamaulipas, 2 blocks Veracruz, 6 blocks
Type of Contract	Production Sharing Contract	Production Sharing Contract	Licenses
Cost to access Data Room	MXN \$ 5,300,000 (Approximately US \$340,000)	MXN \$ 5,300,000 (Approximately US \$340,000)	MXN \$2,500,000 (approximately US \$160,000)
Cost for bidding registration	MXN \$280,000 (Approximately US \$18,500)	MXN \$280,000 (Approximately US \$18,500)	MXN \$280,000 (Approximately US \$18,500)
National Content	13% during exploration period thereafter during the Production period to begin with 25% and gradually increase the goal up to 35% in 2025	17% during appraisal period; 25% first development year to be increased gradually up to 35% in 2025	22% during the evaluation period. Once production begins 27% and gradually to be increased up to 38% in 2025
Length of Contracts	Exploration from 3-5 years, production up to 22 years, for a total length of 25 years that can be extended by two subsequent periods of 5 years each	Assessment up to 3 years. Production up to 23 years for a total of 25 years with the possibly of extending the contract up to two periods of 5 years each	1 year for assessment and 24 years for a total length of 25 years that can be extended by two 5 year term each
Size of blocks / Total area	116-501 km ² Total area: 4,222 km ²	42- 68 km ² Total area: 280.9 km ²	32km ² average Total area: 807.1 km ²

TABLE 19 (Continued)
Comparative Aspects of the first three tenders of Round One

Terms	Shallow Waters (Exploration)	Shallow Waters (Production)	Onshore (Mature fields)
Contractual Rescission	Included in contract with process and conditions	Included in contract with process and conditions	Included in contract with process and conditions
Arbitration	Arbitration with UNCITRAL commercial rules At the Permanent Court at The Hague	Arbitration with UNCITRAL commercial rules At the Permanent Court at The Hague	Arbitration with UNCITRAL commercial rules At the Permanent Court at The Hague
Administrative Rescission	Clause with causes included in PSC contracts with option to cure	Clause with causes included in PSC contracts with option to cure	Clause included in License contracts with option to cure
Applicable Law / Court	Mexican Laws. Federal Courts	Mexican Laws. Federal Courts	Mexican Laws. Federal Courts
Technical Experience	<p>Focused on corporate experience</p> <p>Demonstrate verifiable experience as operator during 2010-2014</p> <p>At least 3 E&P projects</p> <p style="text-align: center;">Or</p> <p>Aggregate amount of capital investment of at least US \$1B</p> <p>Demonstrate experience on offshore projects in past 5 years. Must be operator in at least ONE E&P offshore Project or partner in 2 offshore E&P</p> <p>Must have experience in the implementation and operation of industrial security systems, operations security and environmental protection in facilities or E&P projects</p> <p>Key management team must have 10 years of experience in E&P projects offshore</p>	<p>Focused on corporate experience</p> <p>Demonstrate verifiable experience as operator during 2010-2014</p> <p>At least 3 production projects</p> <p style="text-align: center;">Or</p> <p>Aggregate amount of capital investment of at least US \$1B</p> <p>Must have been the operator in at least 1 project on shallow or deep waters projects. With a minimum production of 10,000 barrels of crude oil equivalent daily. on average in any year for the period 2010-2014.</p> <p>Must have experience in the implementation and operation of industrial security systems, operations security and environmental protection in facilities or E&P projects during past 5 years</p> <p>Management team must have 10 years of experience in E&P projects offshore</p>	<p>Focused on personal experience</p> <p>Company or proposed personnel must demonstrate to have experience in implementation and system operation and industrial safety in the last 5 years</p> <p>Management team must have 10 years of experience in E&P projects onshore and/or offshore</p>

TABLE 19 (Continued)
Comparative Aspects of the first three tenders of Round One

Terms	Shallow Waters (Exploration)	Shallow Waters (Production)	Onshore (Mature fields)
Financial Experience	Demonstrate total assets of at least \$US 10 billion in value.	Demonstrate Total assets of at least \$US 10 billion in value	Total assets from US \$5M in Areas Type 1 ⁷⁰ US \$ 200M in Areas Type 2 ⁷¹ Or In a Consortium the operator must have assets of US \$ 3 M Area Type 1 US \$120 M Area Type 2 and an aggregate amount of US \$80 M for each Area type 2
	Shareholders (max 3) equity of at least US \$1B Or Designated operator of a consortium minimum of US with \$600 M in equity	Shareholders (max 3) equity of at least US \$1B. Or Designated operator of a consortium minimum of U US \$600 M in equity	
	In a consortium an operator must have at least 1/3 of the economic interest	In a consortium an operator must have at least 1/3 of the economic interest	In a consortium an operator must have at least 1/3 of the economic interest

⁷⁰ Area Type 1: Contractual area with a volume of liquid hydrocarbons below 100 Million barrels

⁷¹ Area Type 2: Contractual area with a volume of liquid hydrocarbons below 100 Million barrels

11. Social Impact Assessment

Due to the social impacts that have affected both individuals and social groups, the development of energy projects has garnered scrutiny from communities, governments and energy companies. According to Daniel Franks (2012), the development of energy projects have social, economic and environmental effects within communities. These effects can be reflected in an increased demand for social infrastructure and services, changes in community culture and customs, pollution, disruption of ecosystem services and human rights vulnerability. Some positive effects are an increase in job creation, the strengthening of the local economy, and a developing of social programs for community development.

Energy projects must comply with international standards with regards to social licensing obtained by social endorsement for the projects. The LH states that contractors who are interested in obtaining a permit to develop E&P must submit a social impact assessment to SENER. This assessment evaluates any social impact that might arise from the contractor's activities, as well as corresponding social mitigation measures and management plans. This evaluation must be submitted according to the guidelines and format established by SENER.

At the beginning of March 2015, SENER presented to COFEMER a draft called: *Disposiciones Administrativas de Carácter General sobre la Evaluación de Impacto Social en el Sector Energético*. These provisions provide stakeholders a guidance on the minimum elements that must be included when preparing and presenting the Social Impact Assessment.

The original document and two copies of the social impact assessment must be presented (printed and in digital format) before the Bureau of Social Impact and Surface Occupation (*Dirección General de Impacto Social y Ocupación Superficial*). The format for the presentation of the Social Impact Assessment should include the elements depicted in the following table:



Table 20
Social Impact Assessment Elements

	Elements of Social Impact Assessment	Comments
1. EXECUTIVE SUMMARY	Obtained results with an emphasis on: Mitigation Measures Positive Impacts Expansion Measures Social Management Plan	<ul style="list-style-type: none"> ✓ Should not exceed 25 pages. ✓ It should contain general information about the project, the proposal and responsible party for the development of the Social Impact Assessment.
2. SECTION A. SOCIAL IMPACT ASSESSMENT	Project Presentation General Project Information Methodology for Social Impact Assessment Area of Influence for Project Result of the Baseline Study Characterization of Indigenous People and Communities Stakeholder Analysis Social Impacts References	<ul style="list-style-type: none"> ✓ General Project information including technical description, physical location, business plan and other administrative related plans. ✓ Methodology can be quantitative and qualitative , the latter should consider participatory techniques. ✓ The baseline is the first measurement of socioeconomic and cultural indicators for the community that is present in the affected area for a project and provides a reference point for the identification, characterization, prediction and assessment of social impact studies.
3. SECTION B. SOCIAL MANAGEMENT PLAN	Executive Summary Introduction Implementation and monitoring of mitigation measures and Positive Expansion Impacts measures. Communication Plan and Community Engagement Social Investment Plan Health and Safety Plan Decommissioning Plan Monitoring Plan	<ul style="list-style-type: none"> ✓ Every plan referred to in section B should provide for is implementation : human resources, financial resources, responsibilities, deadlines and timeline as well as indicators for monitoring and evaluation.
ATTACHMENTS	Articles of Association for the Respondent Meeting Protocols of Respondent Personality Accreditation for whomever appears by the respondent Curriculum Vitae Signed declaration under penalty of perjury that the contents of the Social Impact Assessment are based on reliable data and verifiable information Human rights policies and/or corporate responsibility of the Respondent Respondent Code of Conduct Tables, Maps and/ or diagrams	<ul style="list-style-type: none"> ✓ Submit the original and simple copy of the constitution, the meeting minutes, and the accreditation of personality. ✓ Submit Curriculum Vitae of Respondent and responsible for developing the Social Impact Assessment.

The Bureau of Social Impact and Surface Occupation will prepare a technical report on the Social Impact Assessment based on the following criteria:

- All required components
- It shows that it has been made under a community-based approach to human rights and participation
- Considers a strategy that demonstrates the reliability of their results
- Includes a comprehensive Social Management Plan
- Complies with the requirements of a scientific technical document

For projects in the hydrocarbon sector, a final resolution will be issued within 90 working days following the presentation of the Social Impact Assessment.

12. National Content

The new legal framework for the sector provides the minimum percentage of national content required for entitlements and contracts for E&P of hydrocarbons. The purpose is to establish the minimum Mexican content for industrial activities thereby strengthening Mexican companies and propelling their growth and development in the energy sector.

The Mexican legislature had to find a balance between promoting investment and growing the national industry in this sector without disincentivizing foreign investment. As a result, the LH established that E&P activities performed on national territory must contain a certain degree of national content. This requirement has not yet been defined for exploration and extraction activities for deep or ultra-deep waters.

In accordance with the LH, the SE, will design the methods for measuring national content within the hydrocarbons industry and verify annual compliance. Method will be based on: a) goods and services contracted, taking into consideration their origin b) manual and qualified labor c) training for domestic labor d) investment in local and regional physical infrastructure e) transfer of technology. On November 13, 2014, the *Methodology to Measure National Content in Entitlements and Contracts for the Exploration and Extraction of Hydrocarbons and for Permits in the Hydrocarbons Industry (the Methodology)* was published by the SE in the DOF.

Assignees and contractors must individually comply with a minimum percentage of national content that the SENER and SE shall establish for entitlements and contracts.⁷² Such agreements must include a schedule for compliance with the national content percentage requirement, including applicable terms and phases. The national content requirement must be informed at the commencement of the bidding process; once the proposed bids are approved, national content requirement must form part of the E&P contracts that are awarded in the form of an obligation upon the contractor. Obligations will commence at the time that the exploration plan under such contracts is approved by the CNH.

December 11, 2014 Round One, the CNH published the Bidding Guidelines CNH-R01-C01/2014⁷³ introducing the first shared production contracts for 14 blocks in shallow waters. The methodology and guidelines provide a clear idea of the rules to be applied in order to measure national content with respect to the first exploration and extraction contracts.⁷⁴

As of 2015, the first hydrocarbon exploration and extraction contracts must meet the minimum national content requirement of 25%. Each year, this figure must be increased until it reaches 35% in 2025. The bidding guidelines and the contract models for the first 14 blocks in shallow waters established a 13% national content requirement in the exploration phase.

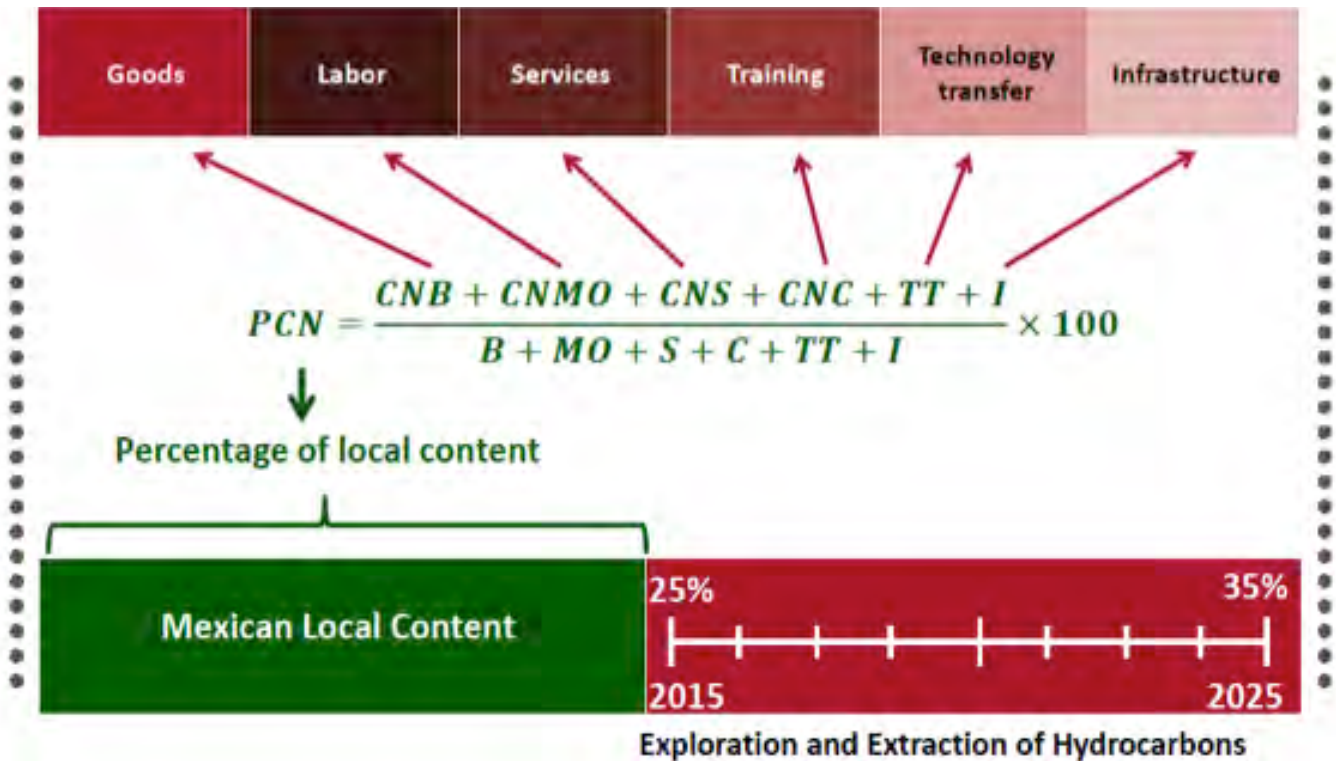
⁷² The Fifth Chapter of the Regulations of the LH published in the Official Journal of the Federation on October 31, 2014 establish guidelines for collaboration that must be implemented by SENER and the SE with respect to national content.

⁷³ Bidding guidelines available at www.ronda1.gob.mx.

⁷⁴ The first contracts will be for a period of 25 years (including 3 to 5 years for the exploration phase), with the ability to extend on two occasions for 5-year terms each time. The extension of the 14 blocks up for bids in shallow waters in the geological areas of Cuenca Salina and Macuspana will be between 116 and 500 km² per block for a total of 4,200 km² up for bidding.

The current contracts for PSC of the first invitation to bid establishes that the contractor must periodically deliver a report to the SE that includes information on national content in accordance with the proceeding established for the verification of such. The following table depicts the concepts utilized by the established methodology.

Figure 24
Methodology for Calculating Local Content



Source: Secretaria de Economía

Article 125 of the LH provides that it is the responsibility of the SE, with the opinion of SENER, to define the strategies for the promotion of direct investment in the hydrocarbons industry, specifically for small and mid-size businesses. Similarly, the law provides a strategy to integrate the supply chain through: a) identification of the targeted industrial sectors and regions b) integrate, administer and update the registry of national suppliers in the hydrocarbons industry; c) implement programs for the development of national suppliers and contractors once business opportunities have been identified; and d) include support programs for technical and financial assistance.

13. Land Use

Concerning land use, there are mechanisms governing the terms of the negotiation between the companies and landowners.

The LH indicates the hydrocarbon industry is of public interest and as such the government shall provide the establishment of legal easements, occupation or necessary surface activities for the realization of the respective hydrocarbons projects. In this sense, the law establishes a procedure that the assignee or contractor must meet in order to obtain the right to use, enjoyment or affecting land, assets or rights needed for the exploration and extraction of this resource.

13-1 The Beginning of the Negotiations

The negotiation process will consider the following:

- Reference values to define the compensation amount generated by the Institute of Administration and Appraisal of National Assets, INDAABIN
- Professional appraisals practice
- Minimum components that should be included in the consideration
- Contract models designed by SENER with the input of the Ministry of Agrarian Territorial, and Urban Development, SEDATU
- Legal advice and representation of the Agrarian Agency
- Participation of social witnesses

The assignee or contractor shall express in writing to the owner of the land, property or right of their interest to use, enjoy, affect or acquire surface rights. The SENER and the SEDATU must be notified of the intent to begin negotiations. In the notice, Contractors must attach information on average land values issued by the Institute of Management of National Property, which will be the basis for negotiations. The Contractor should also explain and describe the project, respond to questions if any, and define possible consequences of the project execution, individual and social benefits expected.

13-2 The Agreement

There are two possible scenarios:

(1) If there is an agreement between the parties relating to the use of the land and the consideration to be paid, the agreement must be submitted to the District Judge in Civil Matters or competent Unitary Agrarian Tribunal in order to be validated, giving it *res judicata* effects. It is important to mention that the only available remedy against such resolution will be the *Juicio de Amparo*.

(2) If the parties cannot reach an agreement after 180 calendar days of the initial notification, the assignee or Contractor may:

- Appeal before the District Judge in Civil or Agrarian Court, the constitution of the legal servitude of hydrocarbons
- Request mediation process to SEDATU

If within 30 calendar days from the proposed compensation, defined by SEDATU as part of the negotiation process, and parties have not reached an agreement, the SENER may request the SEDATU to send the proceedings the Executive Federal for the establishment of the bonded hydrocarbon administratively.

In the case of communal land or *ejidos*, the communal landowners, communities or community members may request the advice and representation of the land agency in the negotiation process.

If the common land owners or community members have individually recognized rights, they should get appropriate consideration; otherwise, such consideration shall be paid to the applicable communal land trust fund or any other trust fund as agreed by the parties.

13-3 Compensation

The law establishes the consideration payable for the use, enjoyment or involvement, should be proportional to the requirements of the assignee or contractor. In this regard, the compensation must cover the following elements:

- Payment of expected damages of property or right of the land, considering the market value of the property
- Rental value
- If the project reaches commercial extraction of hydrocarbons, it must include a percentage of the income attributable to the assignee or contractor payments, made after the FMP for Stabilization and Development have been granted. The percentages are:
 - Associated Natural Gas - the rate may not be less than 0.5% or greater than 3%.
 - Oil - the rate may not be less than 0.5% or greater than 2%.

13-4 Hydrocarbon's Easements

Following the proposed amount to be paid as consideration, the INDAABIN will notify the SENER the establishment of corresponding easement. This shall include the following rights:

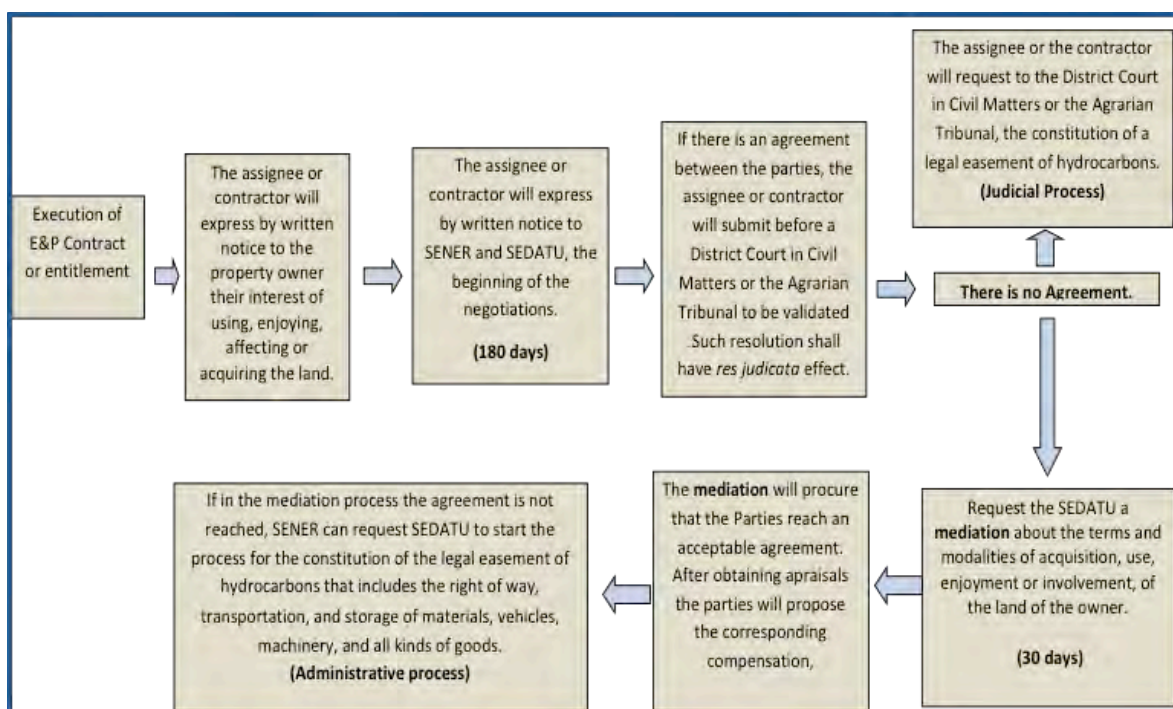
- Transit of people
- Transportation, handling and storage of building materials, vehicles, machinery and goods of all kinds
- Construction, installation or maintenance of infrastructure
- Execution of works necessary for the proper development and monitoring activities under the E&P contract or assignment

Finally, it should be noted that any servitude shall not exceed the terms of the E&P projects or respective assignment. A legal easement can be established by judicial or administrative resolution. The final compensation will be determined according based on the assessments made during the mediation.

13-5 Community Mediation

The relevance of community mediation is key, unlike traditional mediation, it includes a very similar methodology to facilitate dialogue between the parties and promote the achievement of agreements. Community mediation starts from the idea that every individual or communal landowner is entitled to participate in the entire process and is entitled to just compensation. Community mediation provides tools for managing conflicts and divide responsibility among citizens.

Figure 25
Land Use Process



14. Water Permits

The Mexican Constitution states in its Article 27, that the ownership of the waters within the boundaries of national territory is vested originally in the Nation. Only Mexicans by birth or naturalization and Mexican companies shall have the right to acquire ownership of water or to obtain concessions for exploitation. However, the State may grant the same right to foreigners under the terms stipulated in Article 27 of the Constitution.

The National Water Commission (CONAGUA), is the federal institution in charge of preserving national waters. The CONAGUA is the agency in charge of granting permits of wastewater discharges, as well as concessions for the use of both surface and groundwater. The elements of each permit are described below:

Table 21
Sewer Discharge Requirements

Permission for Sewage Discharge	Comments
Request submission by the applicant or the legal representative	<ul style="list-style-type: none"> ✓ This procedure must be performed when wastewater is poured on a permanent or intermittent basis into receiving bodies that are national waters or other national assets including marine water, also when going into land considered a national asset or in other areas where it might contaminate the subsoil or aquifers. ✓ To prove the applicant legal status the interested party or legal representative may submit: Voting IFE Card, Professional Certificate, Valid Passport, or National Military Service Card.
Application Steps	<ul style="list-style-type: none"> ✓ Download the application form in order to process service for CNA-01-001 Discharge Wastewater permit. ✓ Filling application forms and attaching the necessary documentation. ✓ Go to the local service center. ✓ Deliver the forms and documentation to the government employee. ✓ You will receive a confirmation receipt, as well a corresponding file number.
Costs	<ul style="list-style-type: none"> ✓ For the study, the application and if needed authorization of the permit issuance for wastewater discharge from industrial processes, including registration : \$ 4,737 MXN or approximately \$ 307 USD. ✓ For each discharge of wastewater permit, other than those provided for in Section II of Article 192 of the Federal Rights Law, including registration \$ 1,579 MXN or approximately \$102 USD.
Resolution Criteria	<ul style="list-style-type: none"> ✓ The discharge covered by the permit, should not affect or may affect in any way sources of potable water, the ecosystem, public health or others. ✓ The receiving body should be under the authority of the Water Authority. ✓ CONAGUA will take into account the classification of national water bodies, the corresponding Official Mexican Norms and the specific conditions required to comply with the discharge. ✓ The applicant should have knowledge of the tax and fiscal liability that the process involves.
Deadlines	<ul style="list-style-type: none"> ✓ Maximum resolution timeline: 1 to 60 business days from the date of the filing the file being properly integrated.

Table 22
Surface Water Requirements

License for Surface Water Use	Comments
Request submission by the applicant or the legal representative	<ul style="list-style-type: none"> ✓ The process should be performed whenever it is required to exploit or use groundwater in those areas that due to public interest, the Federal powers have regulated, declared close area or declared a reservoir. ✓ To prove the applicant legal status the interested party or legal representative may submit: Voting IFE Card, Professional Certificate, Valid Passport, or National Military Service Card.
Application Steps	<ul style="list-style-type: none"> ✓ Download the application form in order to process service for CNA-01-004 Discharge Wastewater permit. ✓ Filling application forms and attaching the necessary documentation. ✓ Go to the local service center. ✓ Deliver the forms and documentation to the government employee. ✓ You will receive a confirmation receipt, as well a corresponding file number.
Costs	<ul style="list-style-type: none"> ✓ Each title assignment or concession to operate, use or utilize national waters, including registration ✓ \$ 3459.00 MXN or approximately \$ 224 USD.
Resolution Criteria	<ul style="list-style-type: none"> ✓ The duration of proceedings is 5 to 30 years. ✓ It is essential that there is availability of groundwater in the aquifer where the permit is requested in accordance with the Official Mexican Norms NOM-011-CNA-2000 "Water conservation establishes the specifications and the method to determine the average annual national water available" Published in the Official Federation Journal on April 17, 2002. ✓ Check that the waters covered by the application are national property, or where applicable comply with the requirements to consider it as such, in terms of the Mexican Constitution, Article 27 fifth paragraph and the National Water Law and Regulations. ✓ Environmental Impact Study issued by SEMARNAT (Secretariat of Environment and Natural Resources) is required.
Deadlines	<ul style="list-style-type: none"> ✓ Maximum resolution timeline: 1 to 60 business days from the date of the filing the file being properly integrated.

Table 23
Groundwater Use Requirements

License for Groundwater Water Use	Comments
Request submission by the applicant or the legal representative	<ul style="list-style-type: none"> ✓ The process should be performed when required to take advantage or exploit national surface waters such as: rivers, dams, streams, lakes, springs, canals among others. ✓ To prove the applicant legal status the interested party or legal representative may submit : Voting IFE Card, Professional Certificate, Valid Passport or National Military Service Card.
Application Steps	<ul style="list-style-type: none"> ✓ Download the application form in order to process service for CNA-01-003 Discharge Wastewater permit. ✓ Filling application forms and attaching the necessary documentation. ✓ Go to the local service center. ✓ Deliver the forms and documentation to the government employee. ✓ You will receive a confirmation receipt, as well a corresponding file number.
Costs	<ul style="list-style-type: none"> ✓ Each title assignment or concession to operate, use or utilize national waters, including registration \$ 3459.00 MXN or approximately \$ 224 USD.
Resolution Criteria	<ul style="list-style-type: none"> ✓ The duration of proceedings is 5 to 30 years. ✓ Check that the waters covered by the application are national property, or where applicable comply with the requirements to consider it as such, in terms of the Mexican Constitution, Article 27 fifth paragraph and the National Water Law and Regulations. ✓ The applicant must have knowledge of the tax and fiscal liabilities that the process involves.
Deadlines	<ul style="list-style-type: none"> ✓ Maximum resolution timeline: 1 to 60 business days from the date of the filing the file being properly integrated.

15. Specific Fracking, Environmental and Industrial Regulation

Hydraulic fracturing is a technique widely used in the United States for gas extraction associated with shale oil. This technique has been subjected to controversy and debate, as there are concerns within sectors of society and the scientific community in this country about its impact on the environment and human health due to the use of millions of liters of water in a single well fracturing, hydraulic fracturing fluids containing potentially hazardous chemicals that may contaminate aquifers, and therefore wastewater production as tremors⁷⁵ (Zobac and Arent, 2014). In this regard, at the request of the United States Congress, the Environmental Protection Agency conducted a national survey for better understanding of the environmental impacts of hydraulic fracturing.

After an extensive public consultation, in which more than 1.5 million comments were received, the Department of Homeland unveiled in March 20, 2015 the new rules for safe and responsible hydraulic fracturing, which will be applicable to federal and tribal lands. Currently, there are more than 100,000 oil wells or boreholes located on land managed by the Federal Government. The Bureau of Land Management has set new requirements to ensure the integrity of wells, protect water quality and improve the process of public disclosure of the chemicals and other details of hydraulic fracturing operations.⁷⁶

As this occurs in the United States, in Mexico, following the passing of the Energy Reform, important concerns have been raised about the environmental effects of hydraulic fracturing, especially in the states with vast resources of unconventional hydrocarbons, such as: Coahuila, Nuevo León, Tamaulipas and Veracruz. Currently, the country has no federal regulations that govern this technique and provide legal certainty. However, the SEMARNAT, which is the federal Agency responsible for the protection, restoration and conservation of ecosystems and natural resources, has taken an important and positive step to issue the Environmental Guideline for Shale E&P Activities (*Guía de Criterios Ambientales para la Exploración y Extracción de Hidrocarburos Contenidos en Lutitas*).

This Guide provides environmental *recommendations* that oil operators (individuals and productive state enterprises) should follow in E&P activities in shale fields, in order to effectively protect the environment. The Guide introduces the process of hydraulic fracturing, detailing the environmental impacts that may result from inefficient operating conditions.

75 With regard to concerns about the seismic activity in November 2014, the Railroad Commission of Texas (RRC) amended its regulation after the presentation of several low-intensity tremors. This, to require the inclusion of data of seismic activity in the application permits; frequent monitoring of certain wells and to allow the modification, suspension or termination of the license on the ground that a well would be contributing to seismic activity. The new regulation amended Title 16, sections 3.9 and 3.46 of the Administrative Code of the State of Texas.

76 Federal Register/ Vol. 80, No. 58/ Thursday, March 26, 2015/ Rules and Regulations. Department of the Interior. Bureau of Land Management. 43 CFR Part 3160 Oil and Gas; Hydraulic Fracturing on Federal and Indian Lands; Final Rule, pp. 16128-16222.

The Guide includes a complete list of Mexican's Official Standards on environmental matters to be considered by operators and which are mentioned below:

Table 24
Mexican's Standards on Environmental Matters

Mexican Official Standard	Product/Process that Regulates
NOM-001-SEMARNAT-1996	Contaminants in wastewater discharge
NOM-004-SEMARNAT-2002	Environmental protection- sludge and biosolids
NOM-004-CONAGUA-1996	Aquifer protection during maintenance and rehabilitation of water extraction wells
NOM-041-SEMARNAT-2006	Greenhouse gas emissions motor vehicles exhaust pipe
NOM-052-SEMARNAT-2005	Identification, classification and list of hazardous waste
NOM-059-SEMARNAT-2010	Environmentally protection- Native special of flora and fauna
NOM-080-SEMARNAT-1994	Noise Emission- exhaust of motor vehicle
NOM-081-SEMARNAT-1994	Noise Emission- stationary sources and its measurement method
NOM-115-SEMARNAT-2003	Environmental Protection- maintenance activities and land drilling oil wells
NOM-116-SEMARNAT-2005	Environmental Protection- land seismic prospection
NOM-117-SEMARNAT-2006	Environmentally Protective system convey oil and petrochemicals in liquid and gaseous state by pipeline
NOM-138-SEMARNAT/SSA1-2012	Ceilings- Hydrocarbons in Soil
NOM-143-SEMARNAT-2003	Management of congenital water associated with hydrocarbons
NOM-145-SEMARNAT-2003	Waste confinement in cavities built by dissolution in geologically stable salt domes
NOM-147-SEMARNAT/SSA1-2004	Criteria for determining the concentrations of contaminated soil remediation
NOM-165-SEMARNAT-2013	Substances subject to registration report for release and transfer of pollutants
NMX-R-019-SCFI-2011	Harmonized classification and hazard communication of chemicals

Finally, the guide sets out the **general criteria** with specific recommendations for oil operators during exploration, drilling and well completion, extraction, closure and abandonment of the well, as summarized below:

1. Monitoring and complying with the obligations under the existing legal, regulatory and environmental management framework of environmental issues in Mexico.
2. Submit a statement about Environmental Impact to the Ministry of Environment and Natural Resources.⁷⁷
3. Consider, prior to the start of any activity, the integration baseline study⁷⁸ in order to anticipate the provisions of the Federal Law on Environmental Responsibility,⁷⁹ considering the following information: air quality, groundwater, surface water bodies, flora, wildlife, soil condition, contaminated sites and environmental liabilities, seismicity, fractures and faults on the site.

⁷⁷ The General Law of Ecological Balance and Environmental Protection states that the Environmental Impact Statement is the document by which, based on studies, a significant environmental impact and potential to generate a work or activity is disclosed and how to avoid or mitigate if negative. See Article 28 of the General Law of Ecological Balance and Environmental Protection and Regulation on Environmental Impact Assessment.

⁷⁸ The guide defines the State Base as the condition in which they would have found habitats, ecosystems, natural elements and resources, relations of interaction and environmental services, in the previous time frame surrounding the injury and not being it produced.

⁷⁹ The Federal Environmental Responsibility Law regulates environmental responsibility that comes from damage to the environment, as well as repair and compensation for such damage where it is required by federal judicial proceedings provided for by Article 17 of the Constitution, the alternative mechanisms for resolving disputes, administrative procedures and those that apply to the commission of crimes against the environment and environmental management.

4. Managing, obtaining and maintaining in force the financial guarantees (insurances and/or bonds) that cover the negative environmental impacts of the projects and activities generated from these during and after said project, until proven before the SEMARNAT, that the remediation and restoration conditions, according to the Base State, have been met.
5. Keeping a log of operations that is available at each location so that the competent authority has access to it.
6. Identify, classify and be subject to a comprehensive management plan, municipal management of special and dangerous solid waste, generated during the fracturing process and comply with the provisions of the General Law for the Prevention and Integral Management of Wastes (*Ley General para la Prevención y Manejo integral de los Residuos*)
7. Define the source of water to be used in the extraction of hydrocarbons in shale. Checking availability of basins or aquifers, determined and published by the CONAGUA, opting for the acquisition of rights, the use of wastewater or importing water from neighboring basins or aquifers in the event that water availability is zero or insufficient. If there are alternate sources of water supply, the operator should opt for water whose quality is not suitable for other uses and not subject to treatment.
8. Avoid exploration and extraction of hydrocarbons provided there is evidence of risk of geological strata, in terms of vulnerability of the aquifers or active faults.
9. Perform removal work, cleaning and remediation of the receiving bodies or national property affected by spills of pollutants.
10. Comply with current regulations in terms of dispersion of powders and particulate pollutants in each project stage and noise emission.

15- 1 Hydrocarbons Environmental and Industrial Safety Agency

(ASEA)

The Hydrocarbons Environmental and Industrial Safety Agency (ASEA), is a newly created unit that is responsible for regulating and supervising industrial safety, operational safety and environmental protection of the hydrocarbon sector activities.

The Agency shall participate in the design, regulation and supervision of the following:

- Industrial and operational safety.
- The decommissioning and abandonment of facilities.
- The integral control of waste and emissions.

The ASEA is the regulatory environmental and industrial safety Agency of the hydrocarbon sector, such as: oil & gas, natural gas, LPG, oil and petrochemicals and will consist of several units. One will be the Supervision, Inspection and Industrial Surveillance Unit; which is responsible for making inspections and verification of compliance with regulations on industrial safety and environmental protection. It is important to mention that this activity has been carried out by various federal agencies such as STPS, SEMARNAT and PROFEPA. Each one of them sanctioned the breach of the different agency regulations. The ASEA now unifies the hydrocarbon-related activities of those agencies and their sanction in the event of non-compliance. The ASEA will work with the STPS, which is the agency that is responsible for the safety and health of workers and the workplace.

The ASEA will oversee three critical areas:

- Management systems for industrial safety
- Operational safety
- Environmental protection and safety measures

15-2 Management systems for industrial safety, operational safety and environmental protection

Within management systems we can mention that there are some existing Mexican Standards that are not mandatory but their enforcement and implementation help workplaces to implement a management system for Occupational Safety and Health ("OSH") that may be integrated with other management requirements and help organizations achieve their management objectives in simple and economic security. Mexican standards NMX-SAST-IMNC cover the OSH administration and are intended to provide elements for organizations to develop the basic mechanisms for implementing an OSH management system. The Mexican standard NMX-SAST-001-IMNC specifies requirements for a system of OSH management, which enables an organization to develop and implement a policy and objectives which shall take into account legal requirements and information about OSH risks. This standard is intended to be applied to organizations of all types and sizes, as well as in different geographic, social and cultural

conditions. The overall objective of this standard of OHSMS is to support and promote good OSH practices.

These are the five Mexican Standards issued by the Institute of Standardization and Certification, CA in the field of safety management systems and occupational health:

- BSI OHSAS 18001: 1999 Management Systems Safety and Health at Work-NMX-SAST-001-IMNC-2000. Specification
- BSI OHSAS 18002: 2000 Management Systems Safety and Health at Work-NMX-SAST-002-IMNC-2000. Guidelines for the implementation of NMX-SAST-001-IMNC-2000
- NMX-SAST-003-IMNC-2004 Guidelines for the competence and evaluation of auditors of management systems of safety and health at work
- NMX-SAST-004-IMNC-2004 Guidelines for the implementation of a management system of social responsibility
- BSI OHSAS 18001; 2007 management systems health and safety at work requirements NMX-SAST-001-IMNC-2008. The latest standard will become in the ISO 45000 Standard from 2015

15-3 Safety Measures

In order to maintain the safety and health of workers, facilities and the environments safety measures should be implemented in all workplaces and facilities. These measures should be in compliance with the laws, regulations and Mexican official standards.

16. Exploration Phase

The Exploration as a specific activity is regulated by the LH, and has been defined as the activity or set of activities that make use of diverse methods including the drilling of wells aimed at identifying, discovering and assessing the Hydrocarbons in the subsoil in a defined area.

Exploration period is defined as the period granted to the contractor to conduct surface studies, exploration and appraisal activities which consists of the initial exploration period, the first additional period (if any), the second additional exploration period (if any) and the appraisal period (if any).

The following guidelines establish the exploration process defined by the PSC proposed for the shallow waters tender currently in place.

- Within 45 days following to the execution of the E&P contract, the contractor shall submit the *Exploration Plan* to the CNH. The plan will consider, at a minimum, performance of all of the activities provided for in the *Minimum Work Program*⁸⁰ and shall include the draft of the *Risk Management Program*.⁸¹ CNH will decide on the proposed *Exploration Plan* based on the terms of the applicable laws.
- *The Initial Exploration Period* shall be allotted three contract years, which can be extended up to two subsequent exploration periods. The contractor is required to complete at least the *Minimum Work Program* during the *Initial Exploration Period*. The contractor may, in accordance with the *Work Programs* and *Budgets* approved by CNH, carry out additional petroleum activities as is advisable.
- If the Contractor requires more time than allotted for the first *Initial Exploration Period*, written notice must be given to CNH with at least 60 days prior to the termination of the *Initial Exploration Period*. An extension may be granted for the *Exploration Period* as well as a second *extension period* following the termination of the *Initial Exploration Period* and the *first extension period*, respectively. The contractor may request such extension only if:
 - o Has fully complied with the *Minimum Work Program* during the *Initial Exploration Period*
 - o Agrees to drill one additional well in the contractual area during the *First Additional Exploration Period* with the same characteristics as those provided for the *Minimum Work Program*.

⁸⁰ Petroleum Activities which the Contractor shall carry out during the Exploration Period, it being understood that the Minimum Work Program is only a minimum work program and that the Contractor may carry out additional Surface Reconnaissance and Exploration, Exploration and Appraisal activities during the Exploration Period.

⁸¹ Actions and measures undertaken for the prevention, monitoring and mitigation of identified, analyzed and evaluated risks, as well as of improvement in the performance of a facility or group of facilities, pursuant to the Management System. This program is derived from the Management System and shall be submitted to CNH and in turn forwarded by it to the Agency for approval

- CNH will approve such extensions, if the two foregoing conditions are satisfied, and it receives the first additional period guarantee within 10 business days, after CNH approves the extension and the contractor has complied with all its contractual obligations.
- If the Contractor conducts a *formation test* in any exploration well, it shall notify CNH at least 10 days prior testing. The notice shall be accompanied by the anticipated *formation testing program*. The contractor shall submit the data derived directly from the test to the CNH within 15 days following completion of the test. The Contractor shall submit the relevant information to CNH, along with technical studies and reports conducted within 90 days after the *formation test*.
- *The Discovery*: The contractor shall provide notice to CNH within 5 business days after any discovery is confirmed. In addition, within 15 days from giving notice of the discovery, the contractor shall submit to CNH:
 - o all available technical information related to the discovery, including quality, flow and geological formations
 - o an analysis that establishes details relating to a possible *well testing program*
 - o its preliminary criteria as to the advisability of conducting an *Appraisal* of such Discovery

Work Programs: The contractor shall submit the first *Work Program* in the exploration period within 45 days after signing of the E&P contract for CNH approval. *Work Program* in the Exploration Period shall cover the petroleum activities to be conducted during the first contract year. Thereafter, the contractor shall submit the *Work Program* for each year no later than September 30 of the immediately preceding year.

Budgets: The contractor shall submit a budget of the costs to be incurred in implementation of each *Work Program* for CNH approval. All proposed *Budgets* shall be included E&P contract. The budgets include a detailed estimate of costs necessary to carry out the petroleum activities described in the *Work Program* and a schedule of estimated expenditures of the costs. The contractor shall also provide supporting documents for all estimated costs. The draft *Budget* shall be consistent with the *Exploration Plan*, and the relevant *Work Program*. The first *Budget* for the *Exploration Period* shall be submitted within 45 days following the execution of the E&P contract. The contractor shall submit the *Budget* for each subsequent year no later than September 30 of the immediately preceding year.

The Appraisal: During the initial *Exploration Period*, *First Additional Exploration Period* or *Second Additional Exploration Period*, as the case may be, the contractor may submit a *Work Program* and *Budget* for *appraisal activities* related to the relevant discovery for CNH approval. *The Work Program* for *Appraisal* activities shall establish the *Work Program* of all the relevant discoveries for a 12 month period starting from the date of approval. With a written approval of CNH, this time frame may be extended for up to 12 additional months when the technical or commercial complexity of development of the relevant *Discovery* justifies such exception (the *Appraisal Period*).

The *Work Program* for *Appraisal* of the *Discovery* shall cover the entire area of the structure in which the discovery was made (the *Appraisal Area*), and shall contain at minimum the items indicated in every E&P contract with sufficient scope to allow for an evaluation and determination of whether the *Discovery* can be considered a *Commercial Discovery*. CNH may not deny the proposed *Work Program* without justified cause. The contractor shall commence the *Appraisal* activities in accordance with the terms of the approved *Work Program*.

Hydrocarbons obtained from any testing for determining characteristics of a reservoir and its production flows shall be delivered to the marketer at the location established in the *Work Program* approved by CNH for the *Appraisal* activities. The revenues resulting from their marketing will be distributed pursuant to the mechanisms established in every E&P contract. The contractor shall deliver to CNH a report of all *Appraisal Period* for any *Discovery* no later than 60 days following the end of the *Appraisal Period* for any *Discovery*.

Exploration Phase Payments:

The contractor shall make the following monthly payments specific to the exploration phase

- Based on contractual area for the first 60 months from the beginning of the contract period, \$1,150 MXN per square kilometers from month 61 and thereafter the payment will be of \$2,750 MXN per square kilometers.
- Tax be transferred to specific state entities: based on contractual area during exploration phase: \$1,500 MXN square kilometers and during the production phase \$6,000 MXN square kilometers.



17. Development Plans

The LH ensures that the E&P contracts contain a clause in which the *Development Plan* must be submitted. The approval of the *Development Plans* should have as a fundamental principle, the maximization of the productivity of the contractual area over time.

Once the operator notifies the CNH that they had made a commercial discovery⁸² in a contractual area, they have 120 days to prepare and submit a proposed development plan for said commercial discovery. The *Development Plan* for the production must contain the information required by the CNH and should consider appropriate methods and processes to maximize the ultimate recovery factor of reserves, in accordance with the best industry practices. Table 21 depicts what the CHN establishes as the minimum content for the development plan in shallow waters.

Table 25
Development plan Minimum Content

Content	Comments on the minimum content of the plan of development
1. Description of commercial discovery	It includes a general description of the commercial discovery that are going to be developed; the delimitation of the field; the description of the area in which it is located, and the description of the formations in which hydrocarbons are located.
2. Information of reserves and production	It includes: a) an estimate of tested reserves , probable and possible for each deposit in the field; b) the estimated production profile for each deposit which is expected to deliver at the measuring point, each year at the time of development; c) the explanation of the way in which the production of the tested reserve allows to reach the commercial potential corresponding to such reserve in the most efficient manner, and d), the estimated date of initiation for the commercial production.
3. Description of the proposed activities	It mainly includes: a) a general description of the activities for the proposed development period; b) the main characteristics of the works, services and proposed materials, and additional that had to be made or acquired; c) the development of alternative approaches and the reasons for choosing the selected approach; d) the program of works, services and supply of materials or construction and itinerary to reach commercial production rates; e) in case of commercial discovery, a program proposal for the unified field development extends beyond the contractual area.
4. Budget and economy	It includes: a) an estimate of the annually recoverable costs; b) the proposed arrangement to share facilities, costs or to mix and redistribute production with people outside the contractual area, and c) the expected returning program of the contractual area or any part of it.
5. Risk management programs	These programs must contain at least a description of the measures and actions to prevent, monitor and mitigate the risks identified and evaluated , including emergency and contingency plans to be implemented in accordance with best industry practices , and other considerations that determine the National Agency for Industrial Safety and Environmental Protection of the Oil Sector in accordance with applicable regulations.
6. Outsourcing	Requires a detailed description of the works, services, and materials needed by subcontractors in addition to the development approach, including a program for selecting and hiring subcontractors.
7. Additional Information	The operator must include in his proposed development plan any other additional information that is considered necessary for a complete evaluation of the plan, including the one asked by the commission.
8. Additional information for modifications to the Plan of Development	If the operator wishes to make changes to the development plan, the changes must be submitted to the commission through a document explaining with details in order to justify the proposed amendment and the discussion conducted since the original development plan or from the last modified, as appropriate activities reasons. In the event that the commission does not endorse the amendments proposed by the operator to the development plan, it shall implement the development plan previously approved.
9. National Content and Technology Transference	The operator must include in its proposed development plan two chapters: the deadlines and applicable stages in order to ensure that the specified goal of national content written in the contract and a technology transference program will be achieved.
10. Geological, geophysical and engineering information	The operator must provide to the commission the information used to support the proposed development plan, which must be kept for the duration of the contract.

⁸² According to the CNH, a discovery or build is any structure or group of structures or accumulations in drilling activity that has been shown to contain hydrocarbons that can be extracted to a measurable flow using best industry practices, whether that Hydrocarbon detection may or may not be considered commercially viable removed by the contractor.

CNH may participate as an observer in the internal meetings held by the domestic operators or subcontractors to prepare the development plan. CNH may also require the operator to make changes to the *Development Plan* in the event of a burning or excessive venting of natural gas, excessive or insufficient production of hydrocarbon reserves; an excessive loss of pressure in the reservoir or when a non-optimum spacing between the wells is reached; if the project development plan did not meet or were not consistent with the best industry practices, among other cases.

Finally, the LH states that the CNH will sanction the operator in the following cases: when starting the implementation of the development plan for the extraction without a proper approval, with a fine ranging from 750,000 to 3,000,000 times the amount of the minimum wage;⁸³ and with the failure of the development plan with a fine ranging from 150,000 to 3,000,000 times the amount of the minimum wage.

⁸³ The minimum wage in the geographical area is: \$ 70.10 Mexican Pesos.

18. Production Phase

Declaration of Commerciality and Development Plan: The Contractor shall inform the CNH 60 days after the end of the Appraisal Period, as to whether it considers the discovery to be a commercial discovery. The Contractor shall submit a Development Plan for such commercial discovery to continue with the surface exploration and appraisal activities pursuant to the Exploration Plan in the rest of the contractual area until the end of the Exploration Period or completion of the Minimum Work Program. The declaration of a commercial discovery shall include a description of the Development Area which shall require the approval of CNH.

The Development Plan: Within 90 days following the declaration of a commercial discovery, the Contractor shall submit the related Development Plan, for CNH approval. As required by the E&P contract the Development Plan covers the entire development area containing information regarding methods and processes to obtain the ultimate recovery factor for the reserves, avoiding excessive rates of production and decline or loss of pressure. CNH may participate as an observer at the Contractor's its internal meetings with subcontractors for preparation of the Development Plan. CNH's approval is imperative in order to begin extraction.

CNH may require changes to any Development Plan submitted by the Contractor, without limiting its right to approve the Development Plans, when it determines that:

- The plan results in excessive burning or release of natural gas
 - The hydrocarbon reserves in the development area would be exploited at excessive or insufficient rates
 - There would be an excessive loss of pressure in the reservoir or it would not be possible to achieve the optimal separation distance between wells
 - The proposed Development Plan is not consistent with industry best practices, including environmental, industrial safety and occupational health standards
 - There would be a violation of applicable laws, including environmental standards and for industrial safety and occupational health standards
 - The degree of environmental risk assumed would be an unacceptable pursuant to the applicable laws
 - The Risk Management Program is not within acceptable levels
 - There would be a violation of the Management System or an adverse impact on the environment.
- In such cases, the Development Plan shall be modified to incorporate the proposals made by CNH

The Contractor shall develop the *Commercial Discovery* in accordance with the approved *Development Plan*. The Contractor may propose changes to the *plan* subject to CNH's approval.

Work Programs: The Contractor shall submit an annual copy of the *Work Programs* for each of the petroleum activities (including *abandonment*), containing a list of the individual activities it plans to conduct and the estimated time for the activities for CNG approval. During the *Development Period*, the *Work Programs* shall comply with the relevant *Development Plan*. The *First Work Program* for each *Development Period* shall be submitted along with the *Development Plan* which include the petroleum activities to be conducted during the contract year in which the *Commercial Discovery* is declared. The Contractor shall submit the *Work Program* for each subsequent year, no later than September 30th of the immediately preceding year. All *Work Programs* submitted in the *Development Period* shall contain a monthly production estimate for the applicable year, as well as a forecast of total production of the *Commercial Discovery* during the full term of the contract.

Production Profile: Once the regular commercial production is expected, a production forecast for each well and reservoir shall be included in the *Work Programs*. The *Work Programs* shall contemplate the production of hydrocarbons at the optimal rate in accordance with industry best practices. The Contractor is obligated to carry out all construction, installation, repairs and reconditioning of the wells, gathering facilities and any other facilities necessary for the production activities that adhere with the *Work Programs*, *Risk Managements* and CNH's guidelines. The operator shall maintain all materials used in petroleum activities in good working condition under the *Management System*.

Unitization: In the event that any *Discovery* is part of a structure, formation or deposit extending beyond the contractual area, the SENER may instruct the Contractor to carry out the unitization of fields or shared reservoirs.

Drilling of Wells: Prior to drilling any well, the Contractor shall obtain the required permits and authorizations.

During the drilling of any well and until the termination of drilling activities, the Contractor shall send CNH the *drilling reports* required by the matching laws. The Contractor shall maintain and deliver a digital record (in original form and available for good quality copy) of all the geological and geophysical information related to the contractual area (including the log files for the wells), to CNH.

The well log files shall contain all the information on drilling, completion, plugging and abandonment of the wells in accordance to industry's best practices as well as:

- The geological stratum through which the well was drilled
- The covering, tubing and equipment installed at the bottom of the well and any changes or alterations
- The hydrocarbons, water and minerals that have been found

Upon completion of any well, the contractor shall submit a *Final Well Completion Report*

Every quarter the Contractor shall submit a detailed *Progress Report* showing the progress of the petroleum activities during the immediately preceding quarter to CNH including the following information:

- An administrative report containing graphic information showing the current progress of the petroleum activities
- An engineering report describing the critical activities carried out, any actual or anticipated delays, and the measures taken or proposed to be taken to remediate such delays
- A report summarizing any difficulties encountered in any well that could delay the gathering of information or the production of hydrocarbons, in which case an explanation with the actions taken or proposed to be taken by the Contractor to resolve such difficulties must also be included
- A report indicating the progress/completion of any relevant study, test, analysis or technical report relating to petroleum activities during the quarter
- A construction report for the gathering facilities summarizing any difficulties encountered at the site and explaining the actions taken or proposed to be taken by the Contractor to resolve such difficulties
- A report of any activities to be conducted during the next quarter
- A report of performance in industrial safety, operational safety and environmental protection based on the indicators of the *Management System* and those determined by the agency
- A report summarizing compliance by the Contractor and subcontractors with the procedures regarding operational reliability, safety, health and environmental protection
- A detailed report and response to any requests made by CNH

Budget and Recoverable Costs: The Contractor shall submit a budget of the costs to be incurred during implementation of each *Work Program* for CNH approval. All E&P contracts shall include a *Proposed Budget* and shall include costs estimates necessary to implement the petroleum activities described in the *Work Program* and a schedule of estimated expenditures. The draft *Budgets* shall be consistent with the *Development Plan*, and the relevant *Work Program*. The first *Budget* for any *Development Period* shall be submitted along with the related *Development Plan* and include the costs to be incurred during the remaining portion of the contractual year. The Contractor shall submit the budget for each subsequent year no later than September 30th of the immediately preceding year.

Any accounting made by the Contractor relating to the performance of its obligations under the E&P contract shall be recorded in the operating account. Costs incurred in relation to the petroleum activities will be considered *Recoverable Costs* under the E&P contract only if they meet the terms of the guidelines issued by the SHCP.

For any costs actually incurred to be considered a *Recoverable Cost*, it shall be subject to and must comply with all of the requirements set forth in the guidelines issued by the SHCP

The Contractor shall keep at its offices in Mexico all accounting books, supporting documents and other records relating to the petroleum activities. These records shall be made available for inspection, review and audit by any person designated by the SHPC or any other governmental authority.

Self-Consumed Hydrocarbons: The Contractor may use produced hydrocarbons for petroleum activities (including as a part of any *Enhanced Recovery Project*), as fuel or for injection or pneumatic lifting, at no cost, up to levels authorized by CNH in the *Development Plan*. The Contractor may not flare or vent natural gas, except within the limits authorized.

Commercialization of Production of the Contractor: The Contractor may market the portion of the net hydrocarbons corresponding to the Contractor consideration on its own behalf or through any other registered marketer. If the Contractor commercializes its share of the production (to which it is entitled within Mexico), the marketer must be registered with the Energy Regulatory Commission of Mexico in accordance with the applicable laws.

Commercialization of Production of the State: The Contractor shall deliver to the marketer at the measurement points the portion of the net hydrocarbons constituting a share of the state consideration. CNH may change such marketer at any time by written notice to the Contractor.

Specific Tax to Production Activity: Tax directed to any specific state entities is based on contractual area during exploration phase: \$1,500 MXN per square kilometer and during the production phase \$6,000 MXN square kilometer.



19. Measurements at the Wellhead

According to the LH, the CNH shall issue guidelines and monitor its compliance by the assignees, contractors and authorized individuals in relation to the volume measurement systems extracted from crude oil and natural gas, which are installed at each well field point of custody transfer and is delivered for final sale. As published in the DOF, the *Master Plan for the Measurement of Hydrocarbons* in PEP 2011-2015, the *Technical Hydrocarbon Measurement Guidelines* (Guidelines) specifies every tender will indicate how the measurement points⁸⁴ will be done.

The measurement of hydrocarbons is based on national and international legislation. This system includes the installation and auditable verification by third parties with recognized international experience. The goal is to increase transparency in relation to the national hydrocarbon production and sale in the domestic or international market. Furthermore, utilizing comparable practices and equipment allows for the quality and volume of hydrocarbons at various key points to be known.

It is worth mentioning that hydrocarbons, from the contractual area to the point of measurement, are property of the each corresponding state. Therefore, in addition to other obligations under the contract, it is the responsibility of the Contractor to carry out the extraction, collection and transportation of the hydrocarbons to the point of measurement.

Systems of measurement of hydrocarbons must:

- Confirm the volumes and quality of hydrocarbons extracted, transferred and sold correspond to those reported by documents to the CNH, the SENER, and the SHCP. This is so that the original information of measurement and control can be audited by independent third parties, and confirmed by the authorities
- Know at all times the quantities produced, transported and transferred in custody or at points of sale for crude oil and natural gas
- Assess the quantity and quality of oil, based on their economic value or causing corresponding tax payment will be established
- Measure both dynamic hydrocarbons in transport processes and static tank inventories
- Perform analysis, initial, intermediate and final balances, measurable and traceable to the measurement of hydrocarbons. This includes but is not limited to shrinkage, evaporation, leaks and spills, among others. As well as the validation of information, which allows comparisons and detection of possible causes in measurement variations

⁸⁴ "Measurement points" means the places designated by the CNH inside or outside the Contract Area, which will be measured, verified and delivered net Hydrocarbons, as established in this Agreement and the applicable regulations.

- Constant follow up and evaluation of the:
 - Facilities' operations and processes
 - Equipment and measuring instruments
 - General volumes and qualities of oil produced, consumed and lost during the activities of production, processing, transportation and storage

Table 26
Specifications about the measuring points

Specifications Over The Measurement Points	
Quality and Volume of Net Hydrocarbons	To be measured and determined over the measurement points. Failure to do so could cause an immediate request from CNH asking for measurements regarding separation batteries or measurements of the collection and storage systems.
Reception Procedures of Net Hydrocarbons	The contractor must propose procedures of reception and delivery that follow the Manual of Petroleum Measurement Norms no latter than 180 days before the production start date.
Installation, operation, maintenance and calibration	The measurement system, approved by the CNH, must be provided by the contractor. An independent third party, approved by the CNH, will be in charge of verifying if the measurement system, its operation and its administration are apt and capable of measuring the volumes and hydrocarbon quantities that fall under the tolerance and uncertainty parameters established by the CNH.
Records	The contractor must submit to CNH a complete and exact record of every measurement made. The measurement system must also allow real time measurements at the measurement points with remote access to the information.
System Malfunction	In any situation where supervision shows an inaccuracy with the measurements, either the system components or the system measurements are outside of the accorded specifications, the contractor must repair the system immediately and must make sure the system is working perfectly within 72 hours of the initial measurement inaccuracy.
System Replacement	In case the contractor decides to replace the current measurement system, under valid justification, the contractor must notify CNH. CNH will then assign CNH representatives for the supervision of the system replacement. Supervision will be decided by CNH.
Access to the System	CNH officials must be allowed access to the installations, equipment, systems, software and documentation at all times. This permit must be given by the contracting company.
Production Commercialization	At the measurement points, the contractor must submit the hydrocarbon portions that belong to the State to the marketer.
Monthly Payments	Once the contractor initiates production and produced hydrocarbons at the measurement points are delivered, the corresponding payments will be determined and delivered monthly to the correspondents throughout the contracts validity.

Audits

CNH has the right to inspect and review the measurement, operation and management systems as well as witness (with the Contractor) calibration tests within the agreed periods. The estimation of measurements must be verified by external and internal audits.

Calibration Frequency

The calibration frequency of measurement systems shall supplements the historical record. They shall also be governed by trends in its controlled variables, by applying statistical tools (as foreseen in the current regulations) and by avoiding fixed calibration periods.

At points of internal and external sale of hydrocarbons, equipment shall be installed to determine the quality of oil, depending on the product to be measured, such as continuous flow chromatographs. All internal and external measurement for sale and for custody transfer must be monitored by means of telemetry and real-time systems using devices properly installed at the measurement points.

The Obtained Geological Information:

The SENER, the CRE and the CNH shall coordinate the information gathered and use it as a measurement tool for the hydrocarbons, petroleum products and petrochemicals production. This will serve as a balance sheet including measurement from production to marketing and sale to the public. Regarding the extraction activities, the integrated information system considers international industry standards on the measurement of hydrocarbons.

The information generated by the measurement systems must be stored and delivered, electronically, to the CNH. For this purpose, Pemex will use the *Registry Logs*, which will serve as a base-line for the audit process. The current model of PSC set for shallow-waters states "the volume and quality of the net hydrocarbons shall be measured and determined at the measurement points pursuant to the procedures established by the applicable laws." Additionally, if the CNH requests the volume and quality measurement of the hydrocarbons produced at the wellhead, at separation batteries or any point along the gathering and storage systems, the Contractor shall furnish and install the additional equipment necessary to conduct such measurements.

No later than 180 days before the commencement of the regular commercial production, the Contractor shall propose procedures for delivery and receipt of net hydrocarbons. Such procedures shall govern the scheduling, storage, measurement and quality monitoring of the net hydrocarbons delivered at the measurement points. The procedures shall comply with the provisions of the respective E&P contract while complying with the latest version of the Manual of Petroleum Measurement Standards of the American Petroleum Institute, which covers the following matters: the measurement systems, short-term production delivery forecasts, scheduling of delivery/receipt, and environmental protection measures. CNH will review the Contractor's proposed procedures and will indicate any objection within 30 days.

Under CNH's supervision the Contractor shall be responsible for the installation, operation, maintenance and calibration of the measurement systems. In order to verify that all applicable laws are followed, the Contractor will supply the appropriate measuring system with CNH approval. At the Contractor's expense, an independent third party shall verify that the measurement system's operation and management are suitable and that it measures the volumes and quality of the hydrocarbons within the parameters of uncertainty and tolerance established by the CNH. The operator shall keep a complete and accurate record of all hydrocarbon measurements and shall make it available to the CNH. Representatives of the CNH will inspect and examine the Contractor's measurement system, operation and management systems. Furthermore, CNH representatives (along with the Contractor) may be present for the calibration tests in order to determine acceptable correction factors for temperature, pressure, specific gravity and other factors. The measurement systems also allow the parties to conduct measurement in real time at the measurement points with remote access to the information.

If any inspection or test shows that any component of the measurement systems does not comply with the specifications, is malfunctioning or is incorrectly calibrated, the Contractor shall repair it immediately and ensure that it is in good working order within 72 hours after the defect is discovered or noticed by the CNH. If any test or inspection results in an inaccurate measurement system by more than one per cent (1%) or is out of order, the Contractor shall perform an adjustment to correct the inaccuracy of the readings taken by the defective measurement, in accordance to the following guidelines:

- The parties shall endeavor to agree, in good faith, on an appropriate adjustment
- If the parties fail to agree on an appropriate adjustment within 10 days from the date the inaccuracy or failure was discovered, measurement shall be conducted using appropriate backup meters
- In the case of failures or inaccuracies of the measurement systems where backup meters have not been installed, have failed, or have been found to be inaccurate by more than one percent (1%), the period during which measurements shall be adjusted will be the second half of the period, beginning at the time of the last test of the malfunctioning measurement systems. The amount of hydrocarbons delivered during such adjustment period shall be estimated based on all available information, including the records of any hydrocarbons sales

Measurements adjusted shall be used to recalculate the amount due for the period of inaccuracy. If for justified reasons, the Contractor decides to replace any measurement system or any related elements or software, CNH must be notified so that they have an opportunity to be present during the replacement if considered appropriate.

Access to Measurement Systems

The Contractor shall allow CNH officials or anyone designated, to have access to the their facilities, equipment, systems, software and documentation related to measurement, and provide the support needed during inspection or verification visits.




20. Payments to the Government and to Contractors

The new LIH establishes the mechanisms to determine the amount of considerations to be paid by the Contractor to the Mexican Government as originated in the E&P contracts (also known as *government take*). The LIH regulates different kinds of compensations (*contraprestaciones*). These payments are an addition to corporate income tax and dividend withholding tax.

Each E&P contract model entails different formulas and payments to and from the Mexican Government to the Contractor. The following table depicts a summary of the financial and fiscal regime for each contracts as determined by the reformed legislation:

Figure 26
Financial and Fiscal Regime of the E&P Contracts

Licenses	Profit Sharing Contract	Production Sharing Contracts	Service Contracts	How do contractors get paid?
Onerous transfer of hydrocarbons	Cash Recovery of costs + remainder of operating profit	In kind Recovery of costs + remainder of operating profit	Cash	
Signature Bonus				How the government gets paid? 
Contractual fee for the exploratory phase (km)		MXN \$1,150 month 1-60 / MXN \$2,750 month 61 and subsequent (km ²)		
Royalties article 24 LH				
Compensation based on contractual hydrocarbon value	Compensation based on operating profit	Compensation based on operating profit		
Adjustment Mechanism	Adjustment Mechanism			
ISR				Taxes
Fee for Exploration and Production		\$1500 MXN Exploration / \$6,000 MXN Production (km ²)		

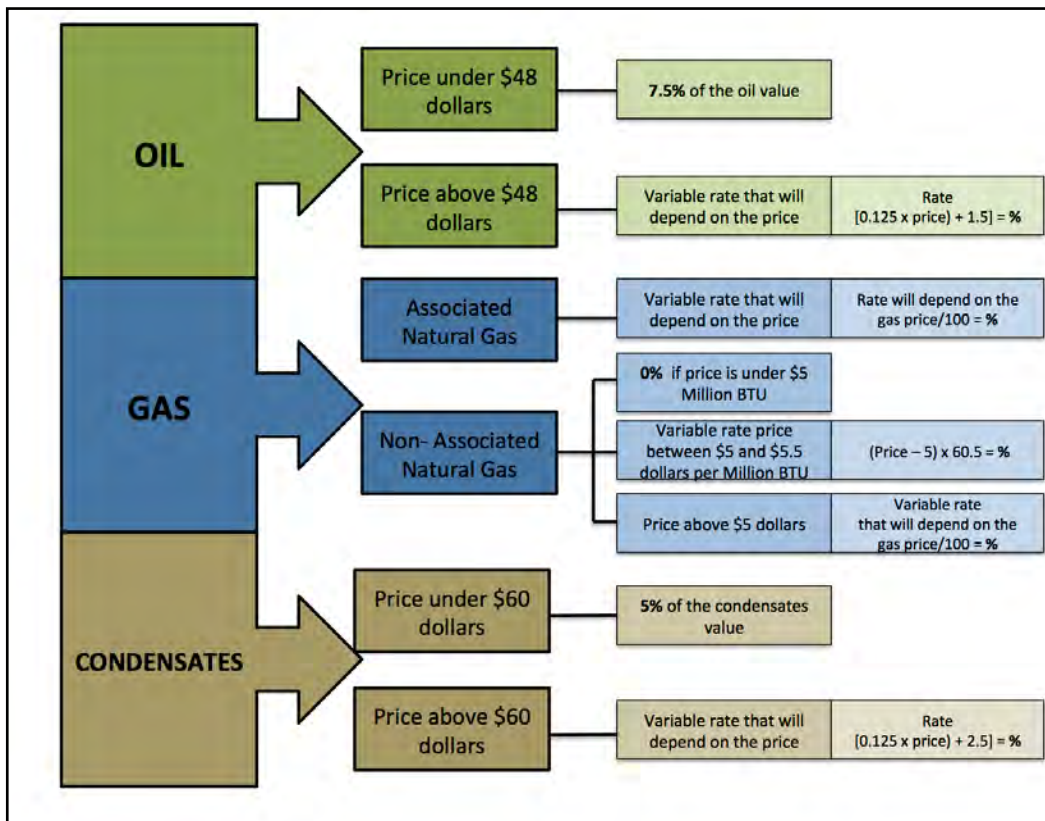
The following describe the considerations and taxes that every Contractor must pay to the Mexican Government dependent on the type of contract entered.

Signing Bonus: For licensed Contracts the SHPC shall determine the signing bonus amounts in the bid terms for each tender process. The signing bonus is paid to the newly established Mexico Oil Fund (FMP). The signing bonus will be paid immediately and under the terms established in the specific tender process.

Contractual Fee for Exploratory Phase: This fee consists of monthly payments during the *Exploratory Phase* in regards to non-producing areas. The purpose of payments is to provide an incentive for Contractor to move promptly to the production phase. The exploratory phase fees are to be paid to the FMP. The fee for the first 60 months is \$1,150 MXP square kilometers and increases to \$2,750 MXP thereafter.

Royalties: Payments to the government are based on the gross income percentage derived from oil, gas and condensate production. Royalties in favor of Mexico will vary depending on the type and market price of the particular hydrocarbon (crude oil, associated and non-associated natural gas, or condensates) effectively produced. Royalties are to be paid in cash. Royalty payments shall be determined based on the “contract value” of produced hydrocarbons, which is calculated by multiplying the volume of production by its “contract price.” The contract price for each type of hydrocarbon is its market price in US dollars, as adjusted pursuant to a mechanism to be established in each E&P contract. The mechanism will take into account the hydrocarbon’s quality, API gravity, marketing, and transportation and logistical costs, among other factors.

Figure 27
Royalties Regime for Hydrocarbons Sector



Compensation based on Hydrocarbon Value: Licensed contracts shall provide for payment to be established on a contract-by-contract basis by the SHCP, depending on the type of project, consisting of a percentage of the contract value of hydrocarbons produced.

Compensation based on operating profits: In profit and production sharing contracts the Mexican Government will retain a percentage of the operating costs. The operating profit will be determined for each period and is the result of subtracting from the contractual value of the hydrocarbons the amount of royalties effectively paid by the Contractor and the compensation related to the recovery of costs.

In a **profit sharing contract**, The Contractor will deliver all of the production to the marketer, who will deliver the revenues resulting from the sale to the Mexican Petroleum Fund. The fund will retain the compensations that the state is entitled to, and will pay the Contractor the compensations they may be entitled to for each period as stated in the contract.

Under the **production sharing contracts** The Contractor retains in-kind production with a value equal to the recoverable costs and its share of operating profits is to be delivered to the marketer. The state will determine in the contract the compensations that the Contractor must give in kind to the marketer, who will deliver the revenues resulting from their sale to the MPF in each period, as stated in the contract. It can be decided not to include compensation relating to the recovery of costs.

Mechanism of adjustment for Licenses: In order to allow the Mexican State to obtain the extraordinary returns, if any, generated by the E&P activities, the rate of the compensation will be determined in the contracts based on the contractual value of the hydrocarbons can be modified using the adjustment mechanism that will be included in the E&P contracts and/or in the bidding terms

Mechanism of adjustment for PSC: In order to allow the Mexican State to obtain the extraordinary returns, if any, generated by the E&P activities the percentages of operating profits and the royalties can be adjusted.

In Service Contracts: Contractors shall submit all the contractual production to the Mexican State and the considerations in favor of the Contractor will be provided in cash and will be established in each contract. The considerations in favor of the Contractor established in service contracts shall be paid by the MPF with the proceeds generated by the sale of production resulting from each service contract.

The SHCP may also combine one or more of the forms of contracts mentioned above, in the hybrid contracts, mainly with regard to the terms and conditions for the government take. The SHCP, as it deems appropriate, may choose to include in any contract with any combination of the considerations outlined in the LH or a combination thereof.

Common Tax Terms

Income Tax: Considerations payable under the E&P contract will be irrespective of the payment of income taxes and other taxes generally applicable to companies doing business in Mexico. Currently, the corporate income tax rate is 30%. However, the LIH provides specific depreciation rates for purposes of calculating the operational profit under E&P contracts.

The following deductions will be allowed for E&P contracts

- 100% of the investments made for exploration, secondary and enhanced recovery, and non-capitalizable maintenance
- 25% investments made for the development and production of oil or natural gas
- 10% investments made for the storage and transportation infrastructure necessary for performing the contract

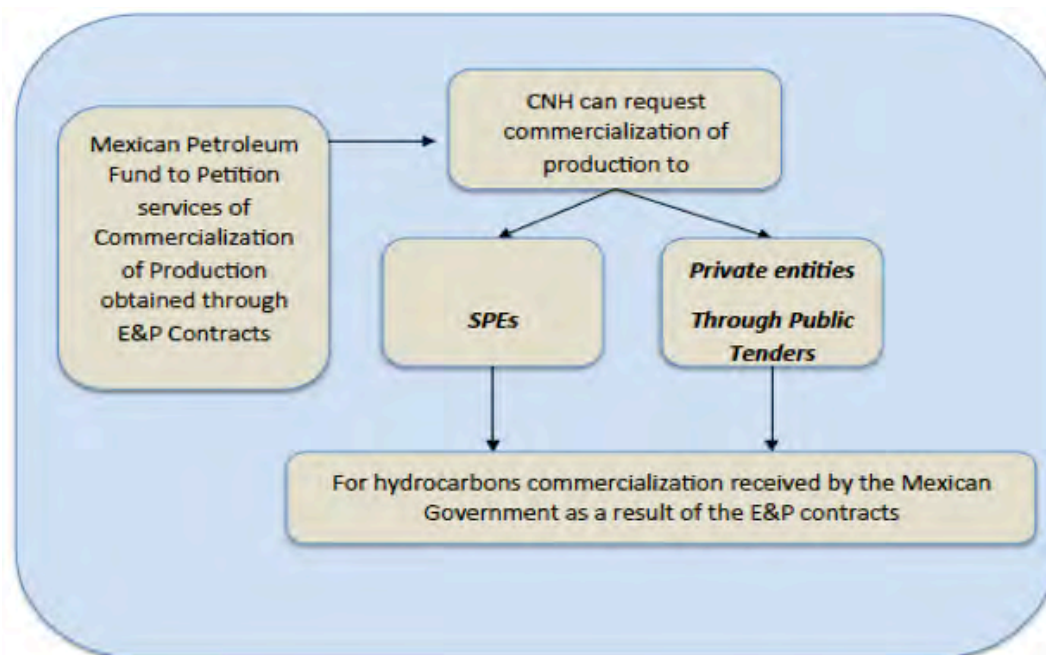
Fee for exploration and production activities: Contractors shall be required to pay a tax as defined in the E&P contract. This tax shall be based on the area covered by the relevant E&P contract or entitlement, at a rate of MX\$1,500 per square kilometer during the exploration phase, and MX\$6,000 per square kilometer during the production phase. The proceeds of this tax shall be distributed among the states and municipalities where the E&P activities are undertaken.

0% VAT: No VAT will be due with respect to any acts or activities for which a consideration is payable under an E&P contract.

21. Commercialization

Until January 1st of 2018 all reported hydrocarbon production will be commercialized only by Pemex. After such date, the production obtained through E&P contracts and entitlements will be transferred to the FMP as part of the payments to the state or in kind as payment to the Contractor. The FMP will petition CNH to commercialize such production.

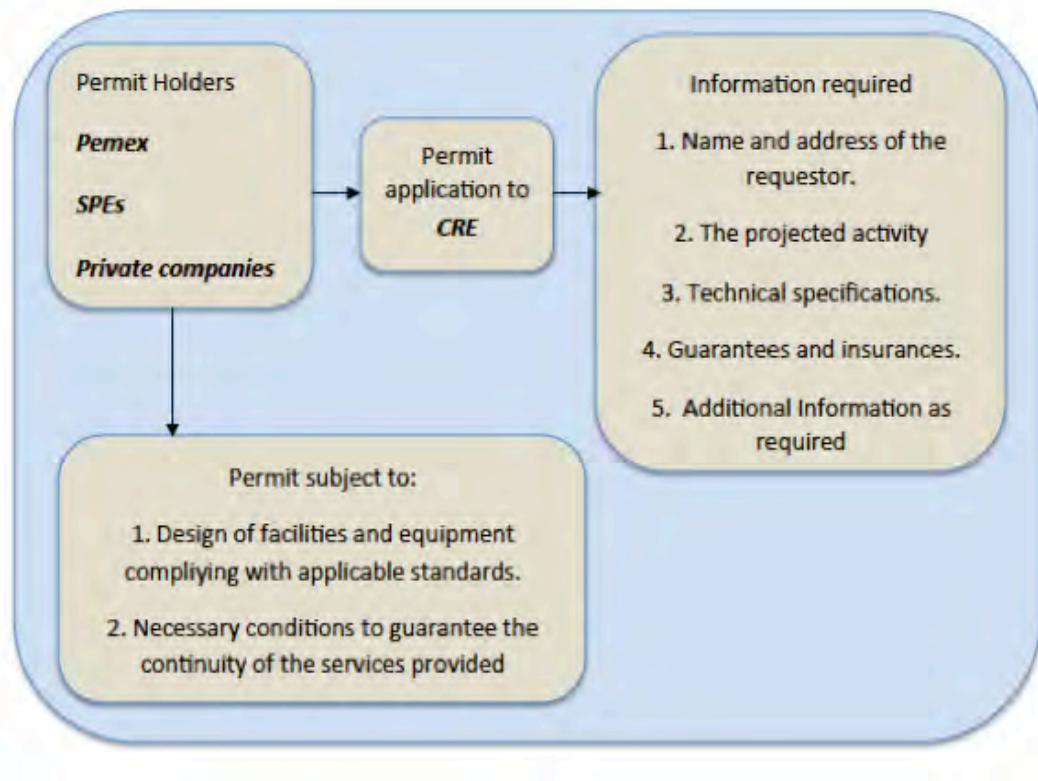
Figure 28
Production delivered to FMP for Commercialization



For the commercialization of activities of hydrocarbons, liquefied petroleum gas, petroleum products and petrochemicals, a permit must be requested complying with the following requirements:

- Register with the CRE
- Hiring, individually or through third parties, of transportation, storage, distribution and sale to the public, which, if any, will be required for carrying out their activities only through licenses
- Comply with the safety measures established by SENER
- Submit the information required by the CRE for statistical purposes of the energy sector
- Comply with the pertinent guidelines

Figure 29
Permit Process for Commercialization Activities



The parties interested in obtaining permits shall file an application before the SENER or the CRE, as applicable, which shall include:

- The name and address of the applicant
- The activity it wishes to pursue
- The technical specifications of the project
- Guarantees and insurance required by the competent authority, as applicable
- Other information established in the corresponding regulation

Additionally, interested parties will have to comply with the following:

- A design of the facilities or equipment in compliance with the applicable laws and best practices
- Meet suitable conditions to ensure the proper continuity of the activity specified in the permit

22. Abandonment, Rescission and Termination

This section will describe how termination, administrative and contractual rescission and abandonment could occur under the new E&P activities.

Administrative Rescission

The state may terminate an E&P contract and determine whether the Contractor has committed any grievances as specified by law. If found culpable the Contractor shall pay severe damages and must end E&P activities within its specified contractual area.

The CNH is the regulatory body that is authorized to perform the administrative rescission when the following occurs:

- Failure to start or suspend activities under the plan of exploration or development for extraction in the contractual area for over 180 calendar days continuously, without just cause
- Failure to comply with the *Minimum Work Program*, without just cause and according to what is specified in the contract
- Part or total cession of the rights conferred by the contract without authorization.
- Serious accident caused by fraud or negligence of the Contractor
- Delivery of maliciously false or incomplete reports
- Breach of any final determination of federal court
- Omission without cause of any payments owed to the State or corresponding delivery of hydrocarbons

It is important to note that the current models for E&P contracts presented as part of the first three tenders have include an option to appeal before the CNH rescinds the contract.

Contractual Rescission

Unlike the administrative rescission, the contractual rescission is agreed by the parties in the contract, and is not imposed unilaterally and coercively by the HL. It has a number of clauses that must be met by the company when entering a contract with the state.

Rescission is an act where compliance of the contract is interrupted due to previously established causes and can be attributed to one party, whether that party be the state, a production company of the state or a private entity, for failing or violating any of the agreed clauses.

CNH may terminate the contractual rescission in the following cases:

- The Contractor does not submit for the approval of CNH the *Assessment Plan* within forty-five (45) days following the date of submission, without cause
- The Contractor shall not have a delay of more than 180 days in any *Development Plan*, without cause
- The Contractor fails to submit the performance guarantee or does not keep the corporate guarantee in effect
- The Contractor or the guarantor is liquidated or otherwise ceases to exist as a corporate or legal entity
- The Contractor or the guarantor becomes insolvent or unable to pay its debts
- The Contractor fails to perform at least 90% of the work units required in the *Minimum Work Program*
- The Contractor violates any provision relating the assignment of the contract
- Any other material breach of the Contractor's obligations under the contract occurs which the Contractor fails to cure or to take direct and continuous action to remedy such breach within 30 days of receiving notice from CNH

Every contract shall establish the applicable laws and the selected place of arbitration. Any dispute arising from the E&P contracts shall be resolved by arbitration pursuant to the Arbitration Rules of the United Nations Commission on International Trade Law (UNCITRAL) The President of the International Court of Justice shall be the nominated authority for the arbitration proceedings. The current E&P contracts have established that the seat of the arbitration shall be the City of The Hague in the Kingdom of the Netherlands.

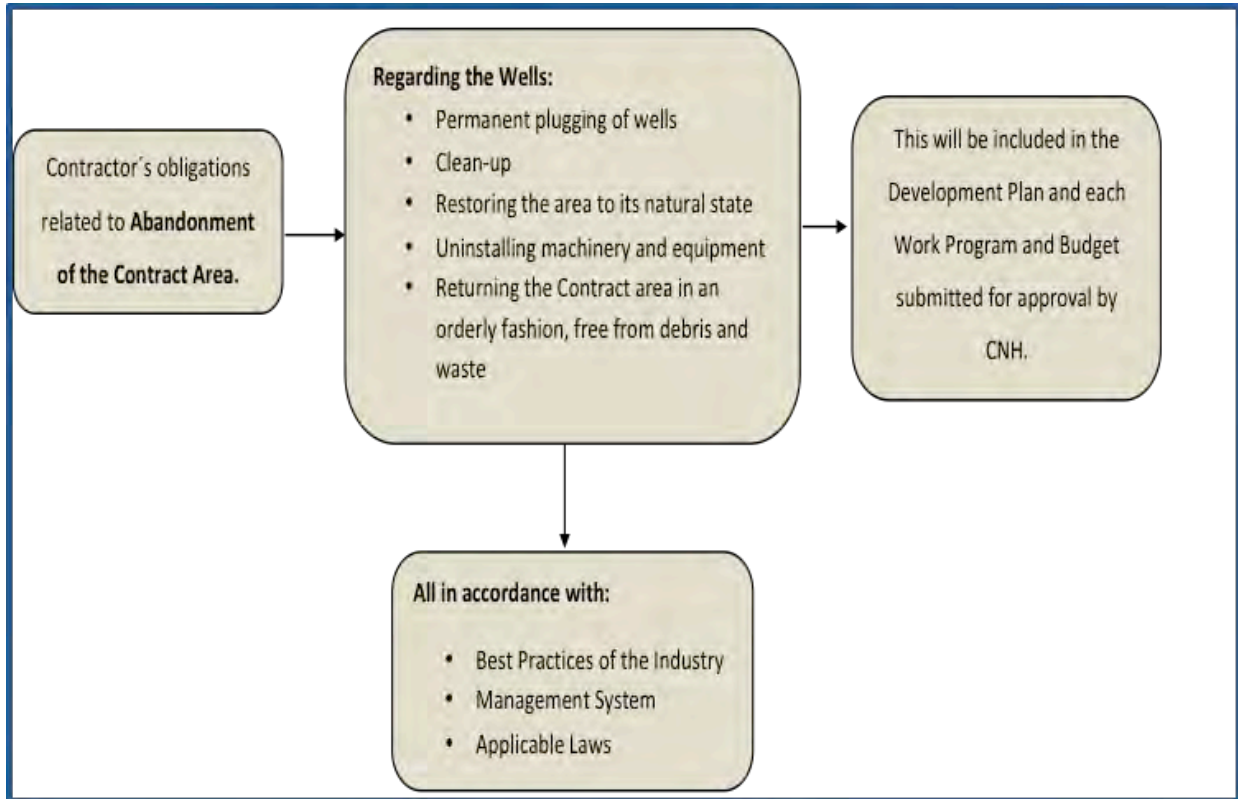
Termination

Termination is a way to end a contract in which each and every one of the clauses stipulated have been met. Meaning, the contract has fulfilled its purpose or term of validity thereof; completion is agreed consensually by the parties as they would not be incurring any irregularity.

Abandonment

Abandonment shall mean all activities of removal and dismantle of materials, including but not limited to permanent plugging and abandonment of wells, the dismantle and removal of all plants, platforms, facilities, machinery and equipment supplied or used by the Contractor in conducting the petroleum activities, as well as the environmental restoration of the affected Contract Area by the Contractor, in accordance with the terms of this Contract.

Figure 30
Abandonment Process



REFERENCES

- América Economía. (2015). *Ranking 2015 Universidades de Mexico*. Retrieved from <http://rankings.americaeconomia.com/mejores-universidades-mexico-2015/>
- Comisión Nacional de Hidrocarburos (CNH). (2014, December 11). *Round 1 Shallow Waters- First Invitation to Bid Bidding Guidelines CNH R01-L01/2014 Unofficial English Translation*. Retrieved from: http://ronda1.gob.mx/English/pdf/PDF-L-01/R01L01_Individual-contract_20141211.pdf
- Comisión Nacional de Hidrocarburos (CNH). (2015, February 27). *Bases de Licitación para la Adjudicación de Contratos de Producción Compartida para la Exploración y Extracción de Hidrocarburos en Aguas Someras-Primera Convocatoria*. Retrieved from: http://ronda1.gob.mx/Espanol/pdf/PDF-L-01/R01L01_Bases-Licitacion_20150227.pdf
- Comisión Nacional de Hidrocarburos (CNH). (2015, February 27). *Shallow Waters- Second Invitation to Bid Bidding Guidelines CNH-R01-L02/2015*. Retrieved from: <http://ronda1.gob.mx/English/pdf/PDF-L-02/BIDDING-GUIDELINES-CNH-SECOND-INVITATION-TO-BID-%28FEBRUARY272015%29.pdf>
- Comisión Nacional de Hidrocarburos (CNH). (2015, February). *Seguimiento a la explotación y extracción de aceite y gas en lutitas*. Retrieved from: http://www.cnh.gob.mx/_docs/Aceite_gas_lutitas/seguimiento_a_la_exploracion_y_extraccion_de_aceite_y_gas_en_lutitas.pdf
- Comisión Nacional de Hidrocarburos (CNH). (2015, January 15). *Regulación de Autorizaciones para el Reconocimiento y la Exploración Superficial (ARES)*. CNH. Retrieved from <http://cnh.gob.mx/ares.aspx>
- Comisión Nacional de Hidrocarburos (CNH). (2015, May 12). *Ronda 1 Terrestres - Tercera Convocatoria Bases de la Licitación CNH-R01-L03/2015*. Retrieved from: http://ronda1.gob.mx/Espanol/pdf/PDF-L-03/R01L03_Bases-Licitacion_20150512.pdf
- Comisión Nacional de Hidrocarburos (CNH). (2015, May 12). *Ronda 1 Terrestres - Tercera Convocatoria Bases de la Licitación CNH-R01-L03/2015. Sección VI Contrato*. Retrieved: http://ronda1.gob.mx/Espanol/pdf/PDF-L-03/R01L03_Contrato-individual_20150512.pdf
- Comisión Nacional de Hidrocarburos (CNH). (nd.). *Criterios de Precalificación R01-L03/2015*. Retrieved from: http://ronda1.gob.mx/Espanol/pdf/PDF-L-03/PDF_R01L03_CriteriosPecalificacion.pdf
- Comisión Nacional de Hidrocarburos (CNH). (nd.). *Pre-qualification Criteria R01-L01/2014*. Retrieved from: http://ronda1.gob.mx/English/pdf/PDF-L-01/R01L01_Prequalification_Criteria.pdf
- Comisión Nacional de Hidrocarburos (CNH). (nd.). *Contract for the Extraction of Hydrocarbons under Production Sharing Modality*. Retrieved from: <http://ronda1.gob.mx/English/pdf/PDF-L-02/PSA-Extraction-Contract-%28Individual%29.pdf>

- Comisión Nacional de Hidrocarburos (CNH). (nd.). *Pre-qualification Criteria R01-L02/2015*. Retrieved from: http://ronda1.gob.mx/English/pdf/PDF-L-02/Prequalification_Criteria-L02.pdf
- Comisión Nacional de Hidrocarburos (CNH). (nd.). Round 1 Shallow Waters-First Invitation to Bid. *Licitación CNH-R01-L01/214*. Retrieved from: <http://ronda1.gob.mx/English/ongoingbid.html>
- Comisión Nacional de Hidrocarburos (CNH). (nd.). Round 1 Shallow Waters-First Invitation to Bid. *Licitación CNH-R01-L02/2015*. Retrieved from: <http://ronda1.gob.mx/English/updatesL02.html>
- Comisión Nacional de Hidrocarburos (CNH). (nd.). *Round 1 Terrestrial - Third invitation to Bid Licitación CNH-R01-L03/2015*. Retrieved from: <http://ronda1.gob.mx/English/processgeneralL03.html>
- Cuevas Leree, A., Muñoz-Cisneros, R., Silva-Saldívar, P., De la Rosa, V.H., Rivas, E.O., González, J., and Fernández-Turner, R. (2004). A New Upper Oligocene Oil Play in Southern Burgos Basin, Mexico. Search and Discovery Article 10075, Adapted from extended abstract prepared for presentation at AAPG Annual convention, April 18-21, 2004
- EIA/ARI World Shale Gas and Shale Oil Resource Assessment. (2013): II-1-I-24. *Energy Information Administration*. June 2013. Web.
- EIA/ARI World Shale Gas and Shale Oil Resource Assessment." (2013): II-1-I-24. *Energy Information Administration*. June 2013. Web.
- Escalera Alcocer, J.A., 2012. "Potencial de Recursos no Convencionales Asociado a Playas de Aceite y Gas de Lutitas en Mexico." ExpoForum PEMEX, August 1, 37 p. (in Spanish).
- Estado de Veracruz. (nd.). Anuario Estadístico y Geográfico. *Secretaría de Finanzas y Planeación del Estado de Veracruz*. Retrieved from: <http://www.veracruz.gob.mx/finanzas/anuario-estadistico-y-geografico-2013/>
- Franks, D. (2012) Evaluación del impacto social de los proyectos de recursos. *International Mining for Development Centre*. Retrieved from: http://im4dc.org/wp-content/uploads/2012/01/UWA_1833_Paper-2_Spanish-version_Social-impactassessment-of-resource-projects.pdf
- Gas Resources: An Assessment of 137 Shale Formations in 41 Countries Outside the United States. *Energy Information Administration*. Retrieved from <http://www.eia.gov/analysis/studies/worldshalegas/>
- Gobierno de Coahuila. (nd.). Web site. *Secretaría de Desarrollo Económico, Competitividad y Turismo*. Retrieved from <http://www.sedecoahuila.gob.mx/>
- Hernández Ordóñez, R. (2015). *Las oportunidades de la Ronda Uno en Mexico* [PowerPoint slides]. Retrieved from <http://energiaadebate.com/wp-content/uploads/2015/03/Ronda1.pdf>
- Mexican Embassy in the United States. (nd.). Key elements of the Energy Reform. Retrieved from <http://embassyofmexico.org/web/KeyElementsoftheEnergyReform.pdf.pdf>

Mexico Diario Oficial de la Federación (DOF).(2013, December) Retrieved from http://www.dof.gob.mx/nota_detalle.php?codigo=5326587&fecha=13/12/2013

Mexico Gobierno de la República. (nd.). *Ronda 1. Procesos Licitatorios*. Retrieved from www.ronda1.gob.mx.

Mexico. Comisión Nacional de Hidrocarburos (CNH). Historia. Retrieved from <http://www.cnh.gob.mx/1100.aspx>

Mexico. Diario Oficial de la Federación (DOF). (2015, December). Retrieved from <http://www.dof.gob.mx>

Mexico. Diario Oficial de la Federación (DOF). (2015, May). Retrieved from <http://www.dof.gob.mx>

Mexico. Diario Oficial de la Federación (DOF). April 28,2015. Retrieved from <http://www.dof.gob.mx>

Office of the United States Trade Representative. (nd.). Mexico. Retrieved from <https://ustr.gov/countries-regions/americas/mexico>

PEMEX, Investor Presentation, November 2012, 43 p. Pemex. (2008, January 1). Recursos prospectivos. *Petróleos Mexicanos*.

Pemex. (2012, November). *Form 6-K, U.S. Securities and Exchange Commission. Pemex*

Pemex. (2013). *Pemex, la industria petrolera y la reforma energética* [PowerPoint slides]. Retrieved from <http://www.canacindra.org.mx/presentaciones/agosto/PEMEX.pdf>

Pemex. (nd.). Investor Presentation. *Pemex-Gas y Petroquímica Básica*, 43 p. Retrieved from <http://www.gas.pemex.com/PGPB/Conozca+Pemex+Gas/Infraestructura/>

Pemex. (nd.). Los Ramones Phase II. *Pemex-Gas y Petroquímica Básica*. Retrieved from <http://www.gas.pemex.com/NR/rdonlyres/014D49D7-5E7A-4103-A8CA-2C5F2B11871D/0/PresentationLosRamonesPhaseII2may2013.pdf>

Pemex. (nd.). *Sistemas de transporte por ducto*. Retrieved from <http://www.gas.pemex.com/PGPB/Conozca+Pemex+Gas/Infraestructura/Sectores+de+ductos/>

Prost, G. and Aranda, M. (2001). Tectonics and Hydrocarbon Systems of the Veracruz Basin, Mexico. In C. Bartolini, R.T. Buffler, and A. Cantú-Chapa, eds., *The Western Gulf of Mexico Basin: Tectonics, Sedimentary Basins, and Petroleum Systems*. American Association of Petroleum Geologists, Memoir 75, 271-291. Retrieved from <http://www.ri.pemex.com/files/content/Form%206-K%20as%20filed%20November%202013,%202012.pdf>

- San Diego Red. (2015, February 25). *The creation of CENAGAS accelerates the implementation of the energy reform*. Retrieved from <http://www.sandiegored.com/noticias/61439/The-creation-of-CENAGAS-accelerates-the-implementation-of-the-energy-reform/>
- Secretaría de Energía (SENER). (nd.). *Reforma Energética: Ronda 1*. Retrieved from http://sener.gob.mx/webSener/rondauno/_doc/Reforma%20Energetica%20Ronda%201.pdf
- Secretaría de Energía (SENER). (nd.). *Procesamiento, Almacenamiento y Transporte de Gas*. Retrieved from: <http://www.energia.gob.mx/portal/Default.aspx?id=1510>
- Secretaría de Energía. (nd.). Programa Estratégico de Formación de Recursos Humanos en Materia Energética. *SENER*. Retrieved from: <http://www.energia.gob.mx/res/Prog%20Estrat.pdf>
- SENER; *Prospectiva del Mercado de Gas Natural 2012-2026*. Retrieved from http://www.sener.gob.mx/res/pe_y_dt/pub/2012/pgn_2012_2026.pdf
- Society of Petroleum Engineers. (2007). *Petroleum Resources Management Systems*. Retrieved from http://www.spe.org/industry/docs/Petroleum_Resources_Management_System_2007.pdf
- United Nations Development Program. (2015). *Indice de Desarrollo Humano para las entidades federativas, Mexico (2015)*. UNDP. Retrieved from http://www.mx.undp.org/content/dam/mexico/docs/Publicaciones/PublicacionesReduccionPobreza/InformesDesarrolloHumano/PNUD_boletinIDH.pdf
- United States Census Bureau. (nd.). *State Imports for Texas*. Retrieved from <http://www.census.gov/foreign-trade/statistics/state/data/imports/tx.html#ctry>
- United States Department of the Interior. (2015, March 26). Oil and Gas; Hydraulic Fracturing on Federal and Indian Lands. *Federal Registry*, (80) 58, 16128-16222. Retrieved from http://www.blm.gov/pgdata/etc/medialib/blm/wo/Communications_Directorate/public_affairs/hydraulicfracturing.Par.91723.File.tmp/HydFrac_SupProposal.pdf
- United States Embassy in Mexico web site. (nd.). Retrieved from <http://mexico.usembassy.gov/eng/econ.html>
- United States Energy Information Administration. (2013, June). Technically Recoverable Shale Oil and Gas Resources: An Assessment of 137 Shale Formations in 41 Countries Outside the United States. Energy Information Administration. Retrieved from <http://www.eia.gov/analysis/studies/worldshalegas/>
- United States Energy Information Administration. (2013, May 13). *Mexico Week: U.S. is Mexico's primary energy trade partner amid shifting trade dynamics*. Retrieved from <http://www.eia.gov/countries/country-data.cfm?fips=MX#pet>
- United States Energy Information Administration. (nd.). *Petroleum & Other Liquids – Data - U.S. Exports to Mexico of Crude Oil and Petroleum Products*. Retrieved from <http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=mttexmx1&f=a>

- United States Energy Information Administration. (nd.). *Texas Profile Analysis*. Retrieved from <http://www.eia.gov/state/analysis.cfm?sid=TX>
- United States Energy Information Administration. (nd.). *U.S. Imports by Country of Origin* http://www.eia.gov/dnav/pet/pet_move_impcus_d_nus_nmx_mbbl_m.htm
- United States Energy Information Administration. (nd.). *U.S. Natural Gas Imports By Point of Entry*. Retrieved from http://www.eia.gov/dnav/ng/ng_move_poe1_a_EPG0_IRP_Mmcf_a.htm
- United States Energy Information Administration. (nd.). *U.S. Natural Gas Exports and Re-Exports By Point of Exit*. Retrieved from http://www.eia.gov/dnav/ng/ng_move_poe2_a_EPG0_ENP_Mmcf_a.htm
- United States Energy Information Administration. (nd.). *U.S. Natural Gas Exports and Re-Exports by Country*. Retrieved from http://www.eia.gov/dnav/ng/ng_move_expc_s1_a.htm
- United States Energy Information Agency. (nd.) Glossary. *EIS*. Retrieved from <http://www.eia.gov/tools/glossary/index.cfm?id=D>
- United States of America Department of Commerce. (nd.). State Export Data. *International Trade Administration*. Retrieved from <http://tse.export.gov/TSE/TSEhome.aspx>
- United States of America Department of Commerce. (nd.). Texas Exports, Jobs, and Foreign Investment. *International Trade Administration*. Retrieved from <http://www.trade.gov/mas/ian/statereports/states/tx.pdf>
- United States of America Department of Commerce. (nd.). Texas Exports, Jobs, and Foreign Investment. *International Trade Administration*. Retrieved from <http://www.trade.gov/mas/ian/statereports/states/tx.pdf>
- University of Texas at Austin. (2014, October 16). Fuel Pipeline Will Go from Mexico to U.S. *Latin American and Caribbean Program*. Retrieved from <http://www.jsg.utexas.edu/lacp/2014/10/fuel-pipeline-will-go-from-mexico-to-u-s/>
- Wilson, C. (nd.). Working Together: Economic Ties between the United States and Mexico. *Wilson Center*. Retrieved from <http://www.wilsoncenter.org/publication/working-together-economic-ties-between-the-united-states-and-mexico>
- Zobac, M and Arent, D (2014), Shale Gas Development: Opportunities and Challenges in The Bridge, Spring, pp. 16-23

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ISBN 970 - 9882 - 79 - 1

EAN 9789709882797