

POTENTIAL IMPACTS AND OPPORTUNITIES FROM **MEXICO'S ENERGY REFORM** FOR WESTERN CANADA



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EXECUTIVE SUMMARY

This report provides an overview of Mexico's energy sector and the content and prospects for the energy reforms passed by the Mexican Congress in December 2013. It concludes with a review of opportunities for western Canadian companies in the reforms.

The basic facts and figures appear in Section I, most notably that Mexico is among the top 10 crude oil producers in the world and the third largest in the Americas, after the United States and Canada. During 2013, Mexico produced an average of 2.5 million barrels/day of crude oil. Natural gas production averaged 6.4 billion cubic feet/day (cfd) in 2013, making Mexico the world's 18th largest. Even so, the country is a net importer of natural gas, mainly from the United States. Natural gas demand is increasing, driven mainly by the electricity sector. Mexico imported 1.3 billion cfd of natural gas in 2013.

The history and evolution of Mexico's energy sector and efforts to reform it over time are examined in Section II. The constitutional reform of December 2013 is mainly about ending PEMEX's and Comisión Federal de Electricidad's (CFE) monopolies over all the hydrocarbon and electricity sector activities. Both these firms will remain owned by the government, but will be transformed into state companies. This means they will operate under profitability criteria – i.e. rather than measuring performance just through tax revenue, PEMEX and CFE will have to comply with corporate best practices, including in accountability and compensation for employees, operation and

managerial autonomy and budgetary independence from the federal government. With Mexico's easy oil reserves declining, the longstanding objective of Mexican governments to use the country's hydrocarbon potential for economic development could no longer be fulfilled solely by government investment through PEMEX. In this new energy context, private investment is required.

Section III analyses both the constitutional reform of December 2013 and the president's proposed bill for legislation, presented mid-May 2014. There are some questions about the implementation and final form of this legislation since it has not yet been discussed or approved by Congress, but the reform will allow for private participation in all energy sector activities. As a consequence, a whole new set of secondary legislation to the constitution, as well as laws and regulations, will need to be approved by Congress. This will be ground breaking for Mexico where oil is seen as the almost sacred blood of the nation and PEMEX its guardian. This is the source of the difficulty in launching these reforms as well as the histrionics that will accompany the debate in Congress about their implementation.

The reform also ends the 53-year-old monopoly position of CFE and opens power generation and commercialization to private investment. The institutional framework for electricity evolves from a limited arrangement, where private investment was restricted to figures such as auto supply and Independent Power Producer (PIE) towards an electricity market with complete openness to private investment in generation and commercialization and the possibility for contracts between the Mexican state and private firms for both transmission and distribution. As opposed to PEMEX, CFE is viewed in Mexico with the same affection that most consumers in North America have for their electricity provider.

Section IV assesses the potential for success and some of the risk factors involved, internally and for external investors. Investment depends on the new roles of the two revamped energy regulators and whether they provide sufficient clarity and transparency in terms of market rules and regulations. Oil theft from pipelines has also become increasingly problematic. There is also the issue of land ownership, community interactions and the right to exploit underground resources.

Finally, opportunities for Canada are explored in Section V. The bilateral economic relationship between Canada and Mexico has grown considerably since the North American Free Trade Agreement (NAFTA) came into force 20 years ago. Since 1994, bilateral merchandise trade has increased six-fold, while Canadian investment flows to Mexico multiplied by a factor of 10. A new competitive, open energy market and sector will most likely increase these flows. Such a shift may move North America towards consolidating as an energy hub.

ACRONYMS

API	American Petroleum Institute density	
bd	Barrels per day	
boe	Barrels of oil equivalent	Centro Nacional de Control de Energía
CENACE	National Electricity Control Centre	Centro Nacional de Control de Gas
CENAGAS	National Natural Gas Control Centre	
cf	Cubic feet	
cfd	Cubic feet per day	Comisión Federal de Electricidad
CFE	National electricity provider	Comisión Nacional de Hidrocarburos
CNH	National Hydrocarbon Commission	Comisión Reguladora de Energía
CRE	Energy Regulatory Commission	
E&P	Exploration and production	
EIA	Energy Intelligence Agency	
FDI	Foreign Direct Investment	
GoM	Gulf of Mexico	
GW	Giga watts	
KWh	Kilowatts per hour	
MW	Mega watts	
NAFTA	North American Free Trade Agreement	
O&G	Oil and Gas	
OCTG	Oil country tubular goods	Partido Acción Nacional
PAN	National Action Party	Petróleos Mexicanos
PEMEX	Integrated national oil company	Productores Independientes de Energía
PIE	Independent power generators	Partido de la Revolución Democrática
PRD	Democratic Revolution Party	Partido Revolucionario Institucional
PRI	Institutional Revolution Party	Secretaría de Energía
SENER	Energy Ministry	Secretaría de Hacienda y Crédito Público
SHCP	Ministry of Finance	
SOE	State Owned Enterprises	Usuarios básicos
UB	Basic electricity users	Usuarios calificados
UC	Qualified electricity users	

I. MEXICO'S ENERGY SECTOR

BASIC FACTS AND FIGURES

Oil

Petróleos Mexicanos (PEMEX) holds the monopoly over all upstream activities and is Mexico's sole petroleum company.

Mexico is among the top 10 crude oil producers in the world, and the 3rd largest in the Americas after the United States (U.S.) and Canada¹. During 2013 Mexico produced an average of 2.5 million barrels per day (bd) of crude oil, of which 53 per cent is of the heavy Maya blend (21-22° API), 34 per cent of output was of the lighter Isthmus grade (32-33° API), and 13 per cent of the extra-light Olmeca (38-39° API)². About three-quarters of Mexico's crude oil production comes from the Gulf of Campeche (offshore), while the onshore southern and northern regions account for 19 per cent and five per cent of the total output, respectively.

CRUDE OIL – BASIC FACTS

	2013 level	World ranking
Production	2,522 thousand bd	10th
Exports	1,189 thousand bd	-
Proved reserves	10.26 billion barrels	18th

Source:

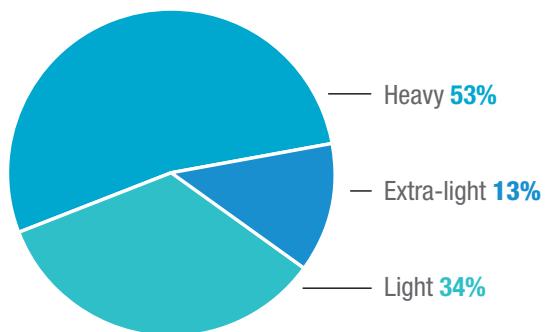
PEMEX, *Monthly petroleum statistics*;
EIA, *Mexico country analysis brief overview*

1 · US Energy Information Administration, Mexico Country Analysis Brief Overview

2 · PEMEX, Monthly Petroleum Statistics.

CRUDE OIL PRODUCTION – 2014

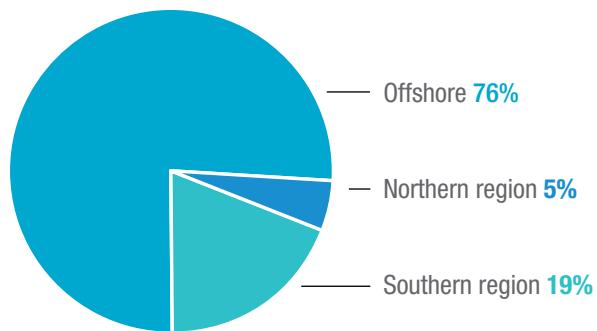
By type



Proven oil reserves amount to 10 billion barrels as of the end of 2013. The majority of the reserves consist of heavy crude oil deposits (21-22o API) mainly located offshore in southern Mexico, particularly in the Bay of Campeche as well as onshore in the states of Tabasco and Veracruz. Other reserves are located in onshore basins in the northern part Mexico, such as Chicontepec.

The magnitude of Mexico's prospective resources is considerable. Mexico's conventional resources amount to more than 54 billion barrels of oil equivalent (boe). Non-conventional resources are estimated to be more than 60 billion boe (53 per cent shale oil and 47 per cent shale gas)³.

By region



Source: PEMEX, Petroleum Statistics, Feb. 2014.

3 - IMCO, 2013. Nos cambiaron el mapa: México ante la revolución energética del siglo XXI, (pg. 74-75)

RESERVES AND PROSPECTIVE RESOURCES DEFINITIONS⁴

RESERVES:

Quantities of petroleum anticipated to be commercially recoverable by application of development projects to known accumulations from a given date forward under defined conditions. Reserves must satisfy four criteria: they must be discovered, recoverable, commercial, and remaining (as of the evaluation date) based on the development project(s) applied. Reserves are further categorized in accordance with the level of certainty associated with the estimates and may be sub-classified based on project maturity and/or characterized by development and production status.

PROVED RESERVES (1P):

Quantities of petroleum, which, by analysis of geoscience and engineering data estimated with reasonable certainty to be commercially recoverable, from a given date forward, from known reservoirs and under defined economic conditions, operating methods and government regulations. If deterministic methods are used, the term reasonable certainty is intended to express a high degree of confidence that the quantities will be recovered. If probabilistic methods are used, there should be at least a 90 per cent probability that the quantities recovered will equal or exceed the estimate.

PROBABLE RESERVES:

Additional reserves which analysis of geoscience and engineering data indicate are less likely to be recovered than proven reserves but more certain to be recovered than possible reserves. It is equally likely that remaining quantities recovered will be greater than or less than the sum of the estimated proven plus probable reserves (2P). In this context, when probabilistic methods are used, there should be at least a 50 per cent probability that the actual quantities recovered will equal or exceed the 2P estimate.

POSSIBLE RESERVES:

Additional reserves which analysis of geoscience and engineering data suggest are less likely to be recoverable than probable reserves. The total quantities ultimately recovered from the project have a low probability to exceed the sum of proven plus probable plus possible (3P) reserves, which is equivalent to the high estimate scenario. In this context, when probabilistic methods are used, there should be at least a 10 per cent probability that the quantities recovered will equal or exceed the 3P estimate.

PROSPECTIVE RESOURCES:

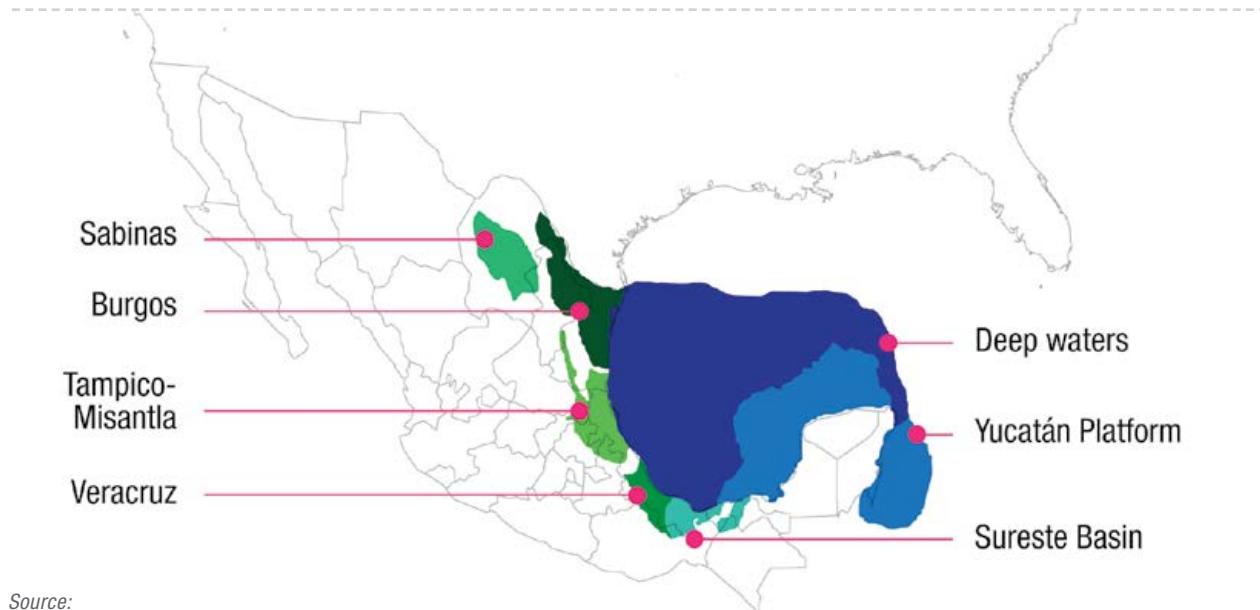
The quantities of petroleum estimated, as of a given date, to be potentially recoverable from undiscovered accumulations by application of future development projects. Prospective resources have both an associated chance of discovery and a chance of development. Prospective resources are further subdivided in accordance with the level of certainty associated with recoverable estimates, assuming their discovery and development and may be sub-classified based on project maturity.

4 - Petroleum Resources Management System el World Petroleum Council, 2009.
http://www.spe.org/industry/docs/Petroleum_Resources_Management_System_2007.pdf

Mexico is believed to have the 5th largest tight oil resource potential globally, i.e. about another 13 billion barrels. Mexico's deep water potential is not sufficiently studied or developed mainly due to the lack of investment

capital. Private investment is needed to complement government spending on reserves development. The next figures show the potential and geographic location of Mexico's reserves.

MEXICO'S RESERVES AND PROSPECTIVE RESOURCES



Source:

PEMEX Exploration and Production, 2012 and PEMEX, Investor Relations, <http://www.ri.PEMEX.com/index.cfm?action=statusfilecat&categoryfileid=11254>

Basin	Acum. Prod.	Reserves		Prospective Resources		
		1P (90%)	2P (50%)	3P (10%)	Conv.	No Conv.
Southeastern	45.4	12.1	18.0	24.4	20.1	
Tampico - Misantla	6.5	1.2	7.0	17.4	2.5	34.8
Burgos	2.3	0.4	0.5	0.7	2.9	15.0
Veracruz	0.7	0.1	0.2	0.3	1.6	0.6
Sabinas	0.1	0.0	0.0	0.1	0.4	9.8
Deep Waters	0.0	0.1	0.1	1.7	26.6	
Yucatán Platform					0.5	
Total	55.0	13.9	26.2	44.5	54.6	60.2
Reserve / PRod (yrs)		10.2	19.3	32.9		

MMBboe (Billion barrels of oil equivalent)

DEVELOPMENT AND
EXPLOITATION PROJECTS

EXPLORATORY
PROJECTS

Natural Gas

Mexico produced an average of 6.4 billion cubic feet per day (cfd) of natural gas during 2013, making the country the 18th largest worldwide producer of natural gas.

More than 60 per cent of Mexico's natural gas production is derived from associated oil and gas fields and the country is a net importer of natural gas, mainly from the United States. Natural gas demand is increasing, and thus so are import needs, driven mainly by the electricity sector.

A significant number of *Comisión Federal de Electricidad* (CFE)'s power plants run on natural gas. Most of the industrial sector uses natural gas as well. Mexico imported 1.3 billion cfd of natural gas in 2013⁵.

Nearly 80 per cent of natural gas imports arrive via pipeline from the U.S.; the rest are LNG imports from Qatar, Nigeria and Peru.

NATURAL GAS – BASIC FACTS

	2013 level	World ranking	Source:
Production	6,370 million cfd	18th	<i>Petróleos Mexicanos, Monthly petroleum statistics;</i> <i>EIA, Mexico country analysis brief overview</i>
Imports	1,290 million cfd	-	
Proved reserves	17.22 trillion cubic feet	30th	

According to PEMEX, Mexico had 17 trillion cubic feet (cf) of proven natural gas reserves as of 2013, placing the country 30th globally in terms of natural gas reserves. The country's southern region holds the largest share of proven reserves, while the country's northern region is expected to be Mexico's biggest reserve expansion mainly from shale.

According to an EIA assessment of the world's shale gas resources, Mexico has an estimated 681 trillion cf of technically recoverable shale gas resources, making it the sixth largest in the world.

The largest portion of Mexico's shale gas resources is believed to be in the country's northeast and east-central regions: the Bay of Burgos accounts for two-thirds of Mexico's technically recoverable shale gas resources, including part of the known Eagle Ford formation, considered Mexico's most promising prospect.

Downstream

There are six refineries in Mexico, all operated by PEMEX, with total refining capacity of 1.54 million bd. Outside Mexico, PEMEX also has a 50 per cent stake in the Deer Park refinery in Texas (334 thousand bd).

Although Mexico is a large exporter of crude oil, it is a net importer of refined petroleum products, such as gasoline and

diesel fuel. Most of the country's refined products are imported from the U.S.⁶. PEMEX imports half of the gasoline used in Mexico, and 65 per cent of the petrochemicals consumed nationally. Refining in Mexico is at a disadvantage, given the country's close proximity to one of the world's most competitive regions, the U.S. Gulf of Mexico.

REFINED PETROLEUM PRODUCTS – BASIC FACTS

As of 2013

Production	1,457 thousand bd
Imports	603 thousand bd
Capacity	1,540 thousand bd

Source:

PEMEX, *Monthly petroleum statistics*;
EIA, *Mexico country analysis brief overview*.

Electricity

The state-owned CFE is the dominant player in the generation sector, controlling more than three-quarters of the country's installed generating capacity. CFE also holds a monopoly on electricity transmission and distribution.

Private participation in electricity generation is permitted in certain categories, including construction and operation of private plants for self-supply, cogeneration, small production (under 30 MW) and import/export.

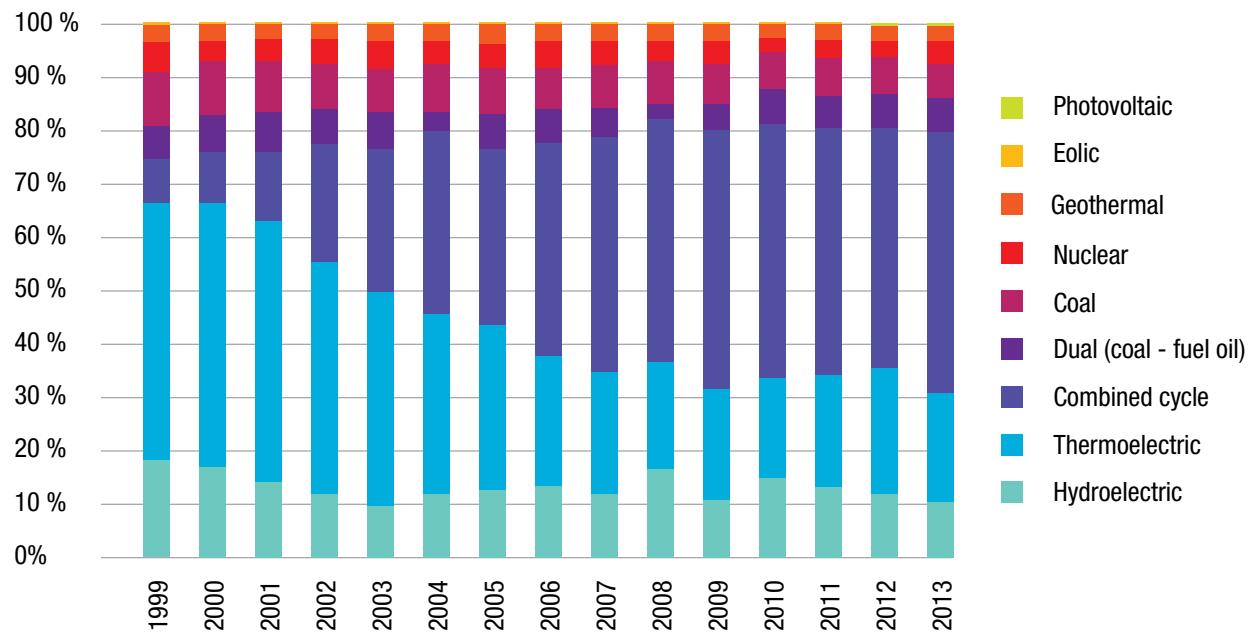
Any company seeking to establish private electricity generating capacity or to begin importing and/or exporting electric power must obtain a permit from the electric sector regulator, *Comisión Reguladora de Energía* (CRE). As of mid-2012, independent generators — *Productores*

Independientes de Energía (PIE) — held about 12.2 GW of generation capacity, consisting mainly of combined-cycle, gas-fired turbines.

According to *Secretaría de Energía* (SENER), Mexico had 53.5 GW of effective generation capacity in 2013. The country generated an estimated 258 billion kWh of electric power in 2013, representing an increase of nearly 25 per cent from a decade ago. Fossil-fueled power plants provide most of Mexico's electricity capacity and generation.

Industry accounts for 58 per cent of Mexico's electricity demand, while the residential sector represents just more than one-quarter. According to CFE, more than 97 per cent of Mexico's population has access to electricity.

ELECTRICITY GENERATION BY SOURCE



Source:

Secretaría de Energía with data from CFE.

CFE's reserve margin in 2013 was 21.2 per cent, which makes the system reliable. Most of the inefficiencies in the sector come from a dispatch process managed by CFE, tariff regulation and insufficient supply of natural gas and underinvestment, mainly in distribution.

The industrial sector faces tariffs that are considerably higher than those across the border in the U.S⁷. This has promoted private sector investments in generation under the aforementioned mechanisms allowed under the current law. A discussion on how the whole sector will be reformed is discussed later in this document.

7 - During the last decade, not only have industrial tariffs in Mexico doubled (they went from ¢6 USD/Kwh in 2003 to ¢12 USD/Kwh in 2013), but they are quite above the tariffs in the US and Canada (¢7 USD/Kwh). Bank of America Merrill Lynch Global Research, 2013, Semanario Económico para América Latina.

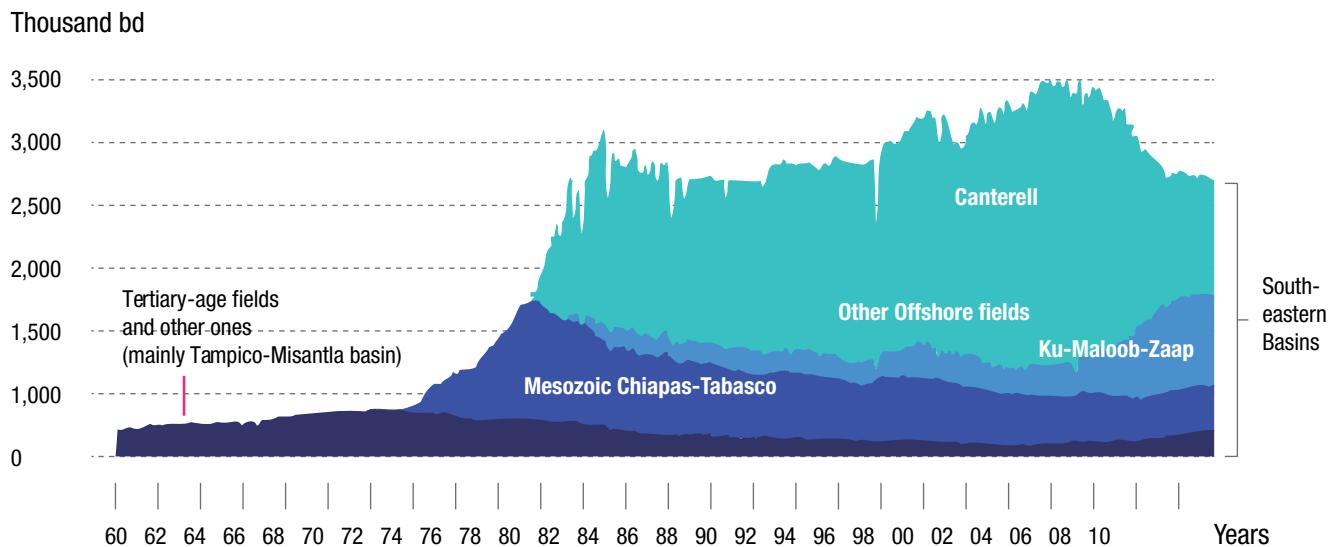
HISTORY: WHY THINGS ARE THE WAY THEY ARE

The institutional framework for Mexico's energy sector has been defined by the state's ownership of the resources and a single state-owned company to develop them: PEMEX.

For the past 10 years, PEMEX has faced two main problems: the decline in production from the offshore Cantarell oil field and the low reserve replacement rate for both oil and gas.

Mexico's oil production peaked in 2004 and has declined since. The main reason for this sustained drop in production can be attributed to Cantarell. In 2001, its average production was 923 bd, the figure for 2011 fell to 448 bd; i.e. production fell 51.4 per cent in a 10-year period.

EVOLUTION OF OIL PRODUCTION

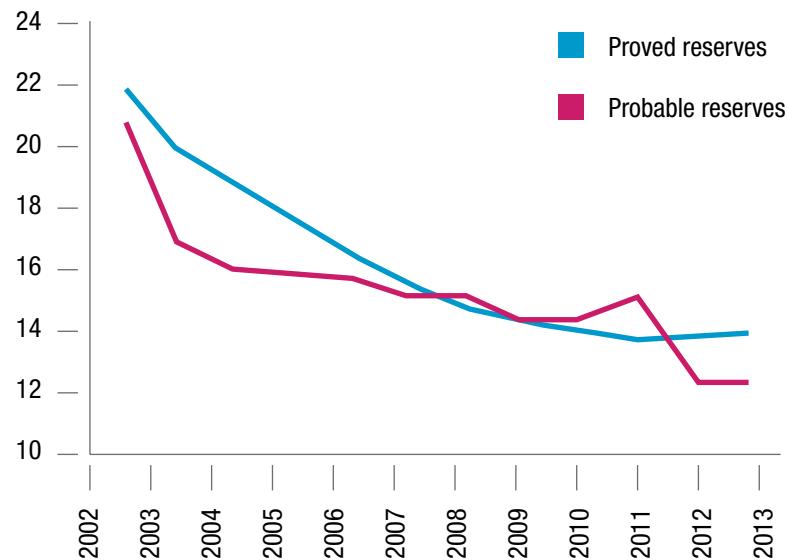


As mentioned, the decrease in production levels has been accompanied by a low reserve replenishment rate for both oil and gas. This has led to a decline of the total stock of

reserves. From 2002 to 2013, proven reserves (1P) have fallen by 37 per cent. This limits oil and gas production in the medium to long term if the trend does not change.

EVOLUTION OF PROVEN AND PROBABLE RESERVES

Billion Boe



Source:

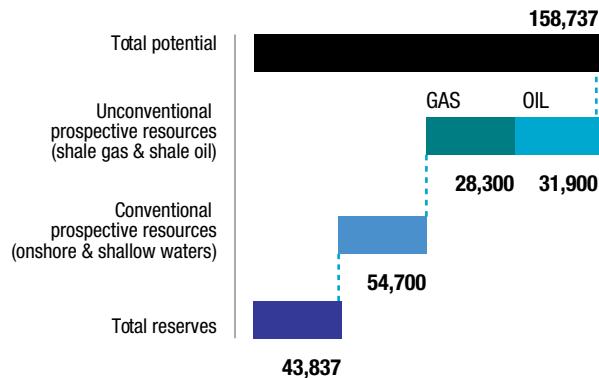
PEMEX, Anuario Estadístico 2013.

The decrease in 1P reserves calls for attention to develop 2P (proven and probable), 3P (proven, probable and possible) and prospective resources that have also decreased as a result of PEMEX not having the capital necessary to develop them. PEMEX investment capital in E&P has increased 11.7 per cent annually for the past 10 years. However, approximately \$300 billion US is needed to develop 2P reserves, i.e. the equivalent to 11.5 times PEMEX's total investment in 2013 (assuming a cost of \$11.43 US per boe).

PEMEX has neither the funds nor the expertise to take advantage of the shale and deep water potential that have proven so abundant across the border in the U.S.

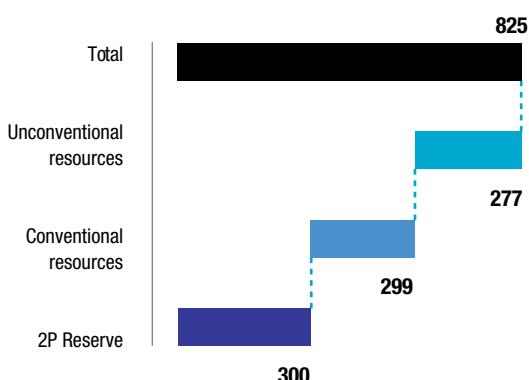
RESERVES AND PROSPECTIVE RESOURCES POTENTIAL

(Million boe)



REQUIRED INVESTMENTS FOR DEVELOPMENT OF RESERVES AND PROSPECTIVE RESOURCES

(Billion USD)



Source:

*Imco's calculations with information from PEMEX;
SENER, National Energy Strategy 2013-2027.*

Lack of sufficient resources and technology prevent Mexico from developing its reserves and has led to a decline in the country's global relevance in the oil sector. In 2012, Mexico was the seventh largest producer of crude oil and 17th in proven reserves, while in 2000 it was fifth and 12th respectively. This has been the most important driver for last year's energy reform.

Natural gas production has risen almost 50 per cent since 2000, but it has not been able to keep up with demand, which has increased about 80 per cent in the same period. As a result of rising domestic consumption, natural gas imports have increased substantially: While in 2000 imports accounted for less than 10 per cent of total consumption, they currently represent 27 per cent⁸.

Conventional natural gas production has lagged behind as a result of the resource allocation process in PEMEX. Oil projects have higher returns than gas projects and thus are first in line in the resource allocation process. For this reason, transport and distribution infrastructure for natural gas have not received sufficient funding to keep pace

with the growth in demand. This has led to an even bigger problem: Not only is domestic production of natural gas insufficient but also so is the infrastructure to transport it to consumers.

Mexico's pipeline network was designed to supply CFE's combined cycle power plants with gas from southeast fields and has not followed the domestic and industrial growth rates in the rest of the country. This lack of capacity has created congestion and failed to satisfy a growing demand, especially among industrial clients.

This problem will remain unsolved if infrastructure is planned in terms of PEMEX's and CFE's needs and if the producer and retailer that transport natural gas remain one and the same.

8 - Ribano Seelke, Claire (coord.), 2014. Mexico's Oil and Gas Sector: Background, Reform Efforts, and Implications for the United States. US Congressional Research Services.

II. THE REFORMS

HISTORICAL CONTEXT

Timeline

1887:

The first oil Company was established in Mexico (Waters Pierce Oil Company, Standard Oil subsidiary), to refine oil in Tampico

1901

Porfirio Díaz promulgates the first oil law and gives concessions to Canadian, Dutch, French, British and German firms to invest in exploration, production and refining of hydrocarbons in Tamaulipas and northern Veracruz

1925

New Oil Law rules concessions

1938

Gral. Lázaro Cárdenas announces the expropriation of the oil industry consisting of the nationalization of 17 foreign companies. Petróleos Mexicanos is created as the national oil company

1940

A constitutional reform bans concessions for hydrocarbons but allows private investment in the industry through service, production sharing and profit sharing contracts

1941

President Manuel Ávila Camacho reforms the law article 27 of the constitution to establish conditions for private investment participation in oil exploration and production by request of the federal government

1960

President Adolfo López Mateos reforms article 27 again to explicitly ban concessions and production and profit sharing contracts. It establishes oil and gas exploration and production are exclusive of the State. Private participation is limited to service contracts with PEMEX only.

1992

PEMEX is reorganized into subsidiary companies according to its business lines: PEMEX Exploración y Producción (E&P), PEMEX Refinación (refining), PEMEX Gas y Petroquímica Básica (gas and basic petrochemicals), and PEMEX Petroquímica (Petrochemicals)

2008

Reform to address budget autonomy and corporate governance for PEMEX. Introduction of contratos integrados for E&P (no ownership rights over hydrocarbons), aiming to increase operational efficiency and transparency. The Comisión Nacional de Hidrocarburos is created.

Sources:

Partido Acción Nacional, *Iniciativa de reforma en materia energética*, http://imco.org.mx/wp-content/uploads/2013/08/Reforma_Energetica_PAN.pdf.

PEMEX, *Historia del petróleo en México* and *El petróleo en México*, www.PEMEX.com.

CURRENT REFORMS CONTEXT

After taking office in December 2012, President Enrique Peña Nieto announced a reformist agenda aimed at boosting Mexico's competitiveness. He also led the creation of the *Pacto por México* (pact), a political agreement among Mexico's three main political parties to discuss a broad set of reforms, which included finance, education, telecommunications, electoral and energy sector reforms.

Negotiations to allow for greater private sector participation in the energy sector through amending the constitution, the first stage of the reforms, resulted in the breaking of the pact. The leftist *Partido de la Revolución Democrática* (PRD),

which agreed to other reforms drew the line at the idea of private participation in oil and gas activities. However, support from the ruling *Partido Revolucionario Institucional* (PRI) and the conservative *Partido Acción Nacional* (PAN) was enough to pass the reform. Passage required approval from two-thirds of Congress and a majority of the country's 32 state legislatures.

On Dec. 20, 2013, Peña Nieto signed into law the approved constitutional amendments and set up the path for a substantial transformation of Mexico's energy sector. The main aspects of the reform include:

- Preserving Mexican state ownership of hydrocarbon resources
- Allowing for private and foreign investment, ending the state monopolies for PEMEX and CFE
- Transforming PEMEX and CFE into state-owned, productive enterprises competing against private companies in all sector activities
- Stripping the oil-workers union of its five seats on the PEMEX board
- Introducing four types of contracts for E&P activities: service contracts, profit-sharing contracts, production sharing-contracts, and licences
- Allowing firms to book oil reserves or the expected revenue-streams from them, for financial-reporting purposes (though hydrocarbons below the ground remain state property)
- Issuing of permits for midstream and downstream activities
- Enhancing the role of existing regulatory agencies
- Creating a sovereign fund to invest oil revenues for the long term from future oil production
- Introducing a new regulatory agency to supervise the operation of national gas pipelines
- Opening of power generation and commercialization to private investment
- Creating an independent power wholesale and grid planner.

These constitutional changes broadly outlined the course of the reform, but many details are yet to be defined in secondary laws. According to the approved bill, the due date for passing secondary legislation through Congress was April 21, 2014 (see schedule below). However, a delay

in the discussion of laws is to be expected as Congress has to approve secondary legislation on telecommunications and political reforms as well. The bill was presented to Congress on April 30 and it is presumed that it will not be discussed until mid-June at the earliest.

Energy reform schedule

DECEMBER 2013:

Enactment of energy reforms



MARCH 2014:

'Round Zero'.

PEMEX holds priority to choose initial fields in which it desires to maintain existing interests or develop in the future.



APRIL 2014:

Congress approval of secondary legislation on:

- > Structure and awarding of contracts
- > Transparency and anti-corruption measures
- > Roles and responsibilities of government entities
- > Revamping of regulatory agencies
- > Sovereign fund operating rules
- > Creation of a new agency for industrial safety and environmental protection
- > Scope of contracts for power transmission and power distribution



SEPTEMBER 2014:

Ministry of Energy and the National Hydrocarbons Commission will determine PEMEX's Round Zero' lease allocation.



DECEMBER 2014:

Promulgation of legislation on:

- > Energy-related environmental regulations;
- > Clean energy obligations and emission reductions for participants in the electricity sector.



APRIL 2015:

Creation of two new independent entities

- > National Center of Natural Gas Control (CENACE), to supervise operations of the national pipeline network currently owned and operated by PEMEX;
- > National Electricity Control Center (CENACE), as the system operator of a wholesale power generation market.



DECEMBER 2015:

PEMEX and CFE are to become 'productive state enterprises'.

The sovereign fund to be fully operational.

ROUND ZERO

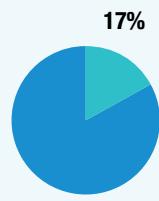
As has happened in other countries such as Norway, Brazil and Colombia, PEMEX – as the incumbent national oil company – will be able to choose the fields in which it wants to operate, according to a set of requirements determined by SENER. This process ends with SENER's final ruling on what is to be allocated to PEMEX prior to the first round of bidding open to private investment. SENER's ruling will be based on the technical support of Comisión Nacional de Hidrocarburos (CNH).

A successful round zero should keep in balance two objectives: guaranteeing PEMEX's viability in the future and setting the conditions on which a competitive oil and gas sector is to be created. Results from Round Zero will be crucial to anticipate where, how and under what conditions private investment is expected to participate.

PEMEX'S REQUESTS UNDER ROUND ZERO

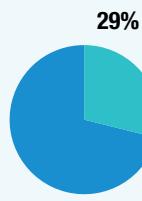
2P Reserves

Billion boe
100% = 24.8



3P Reserves

Billion boe
100% = 43.8



Total prospective resources

Billion boe

112.8

34.5

78.3

Total

Requested areas

Unrequested areas

Source:

PEMEX, Investor Relations, <http://www.ri.PEMEX.com/index.cfm?action=statusfilecat&categoryfileid=11480>

% of prospective resources

31%

69%

Conventional resources

Unconventional resources

PEMEX's requests under Round Zero are, in our view, too ambitious and not in line with its financial and technological capabilities. Most probably SENER will deny a significant portion, while shallow waters and other areas currently under production will be granted. However, some areas in Chicontepec will be denied under the assumption that PEMEX has not been able to develop them economically.

With regards to deepwaters, PEMEX will most likely keep areas in which it has made significant discoveries (Perdido Folt Belt) and be denied the rest, despite the fact some seismic information has been produced. For these areas, we anticipate PEMEX will associate with partners with experience in deep waters.

We consider PEMEX asked for much more than it is able to handle, under the belief that reserves will be the main factor in luring partners who do have the technology and the capital to develop deepwaters and shale resources. However, the government's needs might not be aligned to that rationale. For the reform to be successful, reserves need to be developed, production increased and a competitive sector be constructed; this requires a clear signaling so that private investment can read that there is both the opportunity to associate with PEMEX and to participate independently.

WHAT HAS BEEN DONE – OVERALL AND BY SECTOR

Oil

The constitutional reform of December 2013 is mainly about ending the PEMEX and CFE monopolies over hydrocarbon and electricity sector activities. Both these firms will continue as state-owned companies but will be transformed into "*empresas productivas del Estado*" (productive state companies). This means they will operate under profitability criteria.

The reform's focus has been on laying the basis to develop Mexico's hydrocarbon potential to boost economic development. With Mexico's easy oil reserves declining, this objective could no longer be fulfilled solely by the Mexican government investment through PEMEX.

In this new energy context, private investment is required to achieve the goal of developing Mexico's potential. In April 2014, the federal government submitted secondary legislation to Congress. This package, although a final version has not been agreed on, is consistent with the constitutional reform and sets forth the rules and responsibilities of all the sector's different instances.

As has been noted, PEMEX will be mandated to operate under profitability criteria, as opposed to its current mandate, which is very similar to the operation of a government agency rather than as a corporation.

The anticipated rise of a competitive sector with multiple operators will create a need for strong regulators and rules defining roles within the government. Secondary legislation confirmed what had been included in the constitutional reform.

- CNH will regulate the oil sector. It will provide SENER with technical assistance, will be in charge of geological and seismic information, will organize bidding rounds, as well as manage all contracts and licences resulting from such rounds.
- SENER will define energy policy, and design bidding rounds and their terms, including what areas are to be put up for bidding. It will also decide whether to use contracts or licences, approve exploration and development plans and authorize or revoke assignations to PEMEX.
- Secretaría de Hacienda y Crédito Público (SHCP), will determine fiscal conditions and criteria for the contracts and licences. It will set the criteria for declaring a winning bid in every round with the input of SENER and will supervise cost accounting.

There is a certain degree of overlap in this division of responsibilities. Cost supervision, authorization of exploration and development plans are functions that are typically best managed by the regulator, even though it currently lacks the capabilities to undergo such tasks. This shortcoming could be resolved by a combination of training, hiring and redistribution programs for officials, rather than perpetuating the current arrangement.

Natural Gas

The new natural gas sector will face many different changes as a result of the reform. Proposed legislation lays the basis for the construction of a natural gas market that will operate under open access rules. All activities will be certified and regulated by CRE. Reserve capacity not used will be made available to market participants under open season practices. Permits for transport and commercialization of natural gas will no longer be awarded to the same company. The time frame for this reduction in market share of commercialization and pipeline capacity will be 50 per cent decline in five years and 20 per cent in 10 years.

The reform marks the creation of the (CENAGAS), which will manage all transport, storage and distribution infrastructure of gas currently owned by PEMEX. CENAGAS will be regulated and supervised by CRE.

CENAGAS will coordinate maintenance plans for its infrastructure, offer transport services and develop expansion and optimization plans for the infrastructure it manages and present them to SENER. This new authority will also manage capacity contracts.

Downstream

All industrial activities will be regulated by CRE through retail permits for gasoline and diesel. Regulated tariffs will be determined for transport, storage and distribution. SENER will regulate refining activities, as well as natural gas processing through permits.

The new framework allows private investment in all activities. Private firms will be allowed to import gasoline and diesel starting in 2019. The configuration of the new framework involves open access to pipelines and storage facilities.

RESPONSIBILITIES RELATED TO GASOLINE AND FUELS FOR EACH RELEVANT GOVERNMENT AGENCY

SHP	CRE	SENER
Taxes	Permits for:	Refining permits
Maximum prices	> Retail	
	> Transport	
	> Storage and	
	> Distribution	

Service stations will no longer be exclusive to PEMEX, starting in 2017, and gas stations will be able to sell products from companies other than PEMEX.

As has been already noted, energy policy should be concentrated in SENER while regulation should rely on CRE. Splitting these functions between the two agencies is not

a best practice. Permits for refining activities should fall to CRE and not SENER. The same argument could be made for the unclear boundary between SHCP and CRE in terms of price regulation. Both these issues could be resolved after negotiations in Congress to approve secondary legislation.

Electricity

The reform ends the 53-year-old monopoly position of CFE and opens power generation and commercialization to private investment⁹. The institutional framework for electricity evolves from a limited arrangement where private investment was restricted to certain sectors, such as auto supply and to Independent Power Producers (PIE). It moves towards an electricity market with complete openness to private investment in generation and commercialization and the possibility for contracts between the Mexican state and private firms for both transmission and distribution.

Secondary legislation does not include the market rules. However, it provides for open access to all generators who can sell their energy through contracts or the spot market. The Centro Nacional de Control de Energía (National Electricity Control Centre, CENACE) is created as an independent administrator for the national power system and the wholesale power market. Guaranteeing open and non-discriminatory access to the transmission and distribution networks is one of CENACE's responsibilities. With regards to commercialization, there are two different end-user categories: Usuarios calificados (UC) and Usuarios Básicos (UB). UC refers mainly to industrial and big commercial users, while UB is mainly for residential users and small commercial establishments. For UC, prices will be determined by the market and tariffs will no longer be regulated, whereas for UB tariffs will be regulated. These rates will be set by SHCP and CRE.

There is not much detail on what transmission and distribution contracts will look like and how the needs for grid expansion determined by CENACE could be implemented. The draft legislation appears to mandate CFE to fulfill expansion plans with its own resources or through contracts with private investors.

CRE will remain the sector regulator, but with enhanced attributions. It will grant permits for power generation and set transmission and distribution tariffs. It will also be in charge of providing technical input to SHCP for setting UB tariffs.

9 - Since 1992 private investment has been allowed in the generation of electric power, typically under the figures of self-supply, cogeneration by industrial users and power purchase agreements with CFE.

WHAT REMAINS TO BE DEFINED

Passing of secondary legislation	<p>The proposal sent by the federal government will most likely be discussed during the first weeks of June.</p> <p>However, there are a lot of factors that could delay its discussion and approval (mainly the discussion of telecommunications secondary legislation, and maybe the current discussion of political reform in congress).</p>
Round Zero	<p>SENER will have to determine which areas to award to PEMEX under the Round Zero by September 2014.</p> <p>Most likely it will approve shallow waters and other fields currently under production prior to the September deadline.</p>
Electricity rules	<p>Electricity market rules as well as CENACE's dispatch criteria will have to be drafted and operational by April 2015.</p> <p>Both of these rules are essential to the success of the electricity reform as they will set out the incentives for private parties to participate in the electricity market.</p>
Creation of CENAGAS	<p>According to the reform's schedule, CENAGAS should be fully operational by April 2015.</p> <p>The mechanism for transferring PEMEX's natural gas transport, distribution and storage assets will be crucial for the achievement of a competitive gas sector.</p>

IV. LIKELIHOOD OF SUCCESS FOR REFORMS

Potential benefits from the reform will depend on the strength of secondary legislation. Investment depends on the new roles of the two revamped energy regulators (CNH and CRE) and whether they provide sufficient clarity and transparency in terms of market rules and regulations.

SHCP's power to determine the fiscal terms for contracts is one of the biggest control risks. Fiscal terms are key to the competitiveness of contracts and licences in a global market. Transparency is key in the contracts and their conditions, as is how the proceeds will be invested and spent by the Mexican government. Attracting large amounts of private investment, both foreign and domestic, is crucial to the success of the reforms. However, implementation of the legislation and policy objectives will affect both the flow of investment and the impact in growth and development for Mexico from increases in production of oil and gas and the competitiveness of the electricity sector.

The need for strong regulators and clear legislation is especially sensitive for contracts and tenders to operate efficiently in terms of a fair and institutionalized system of conflict resolution. This will be of particular concern to PEMEX since it has to step up to international best practices and adopt the industry's voluntary principles.

Out of the reform, a host of new agencies and beefed-up regulators will be created to regulate market access to the energy sector and to manage bidding, environmental quality, transport issues, labour relations and a set of other issues.

The biggest challenge for the new regulation will be to create mechanisms to isolate independent regulators and agencies from the political short-term logic of the government in place. It is fair to say that the ultimate success or failure of the energy reform lies on these issues.

The creation of CENAGAS is crucial for midstream activities, especially the management of the pipeline network. These activities require a neutral administrator that guarantees fair access to existing PEMEX ducts. Such an authority goes a long way in creating the right incentives for driving private investment in natural gas pipelines and distribution networks.

Regulatory clarity and agencies' strength can be painful medicine, but it is crucial to build a competitive market and industry. Mexican judiciary is a particularly important factor of the implementation process of the reform. In the end, the judiciary is where many of the gray areas that all such reforms produce will ultimately land for resolution. Mexico's judicial system needs to pay special attention to impartiality and efficiency. The fact that Mexico's energy sector has long been closed is an opportunity to prevent conditions that have led to corruption and extortion in other countries. A strong, impartial and efficient judiciary is absolutely necessary.

Transforming Mexico's state oil, gas and electricity monopolies (CFE and PEMEX) into market-driven enterprises will be a big challenge. So will be implementing changes in the regulator's roles and establishing tax systems for the new market driven sector.

Perhaps the most significant challenge for the power sector has been the discretionary setting of rates by SHCP. New regulation will alter this, allowing the regulator, CRE, to determine rates while SHCP will determine the extent of the subsidies and groups to be favoured by them. If these changes are passed, this should end the practice that prevented the market from reflecting the real production costs and investments in general. Renewables, in particular, faced adverse financial conditions that created large disincentives for the sector's growth.

An issue that will need to be defined more clearly in the future is the extent and speed with which competition will be allowed to reach domestic consumers, especially if contracts with private investors do not provide incentives to invest in distribution networks.

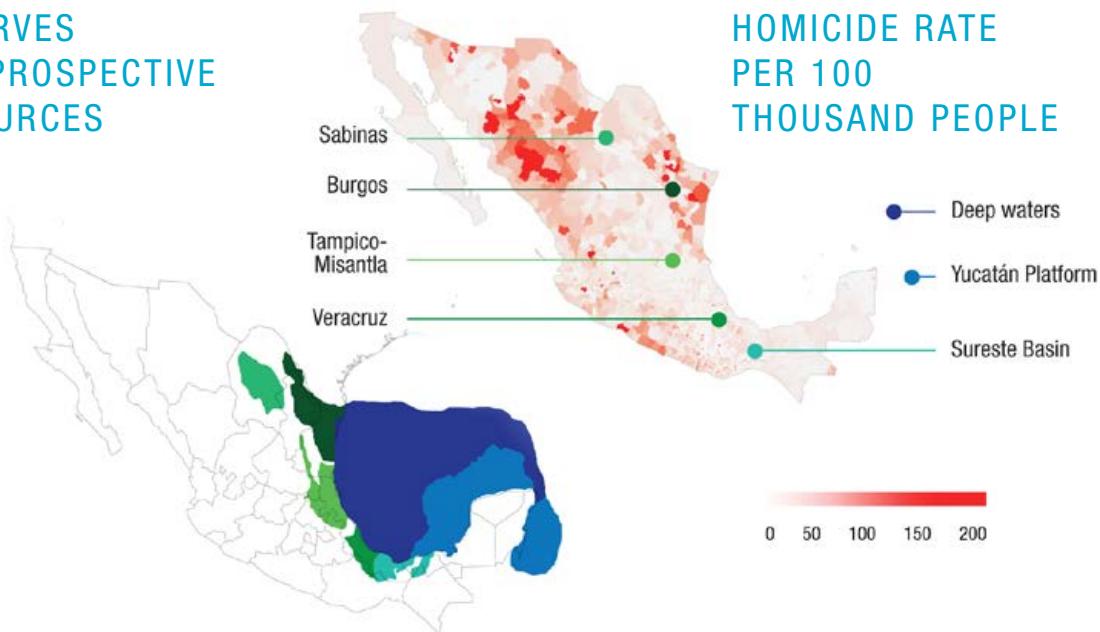
The challenge is to overcome the Mexican government's long-lived financial dependence on revenues from oil sales in international markets, creating a competitive market, transforming PEMEX into a market-driven state-owned company. Using oil revenues for the long-term growth and benefit of Mexico will determine the country's future.

RISKS AND OPPORTUNITIES FOR INTERNATIONAL PARTICIPANTS

Insecurity and violence is an issue that will require the attention of both the government and private investors. Despite the gradual drop in homicide rates since mid-2011, organized crime in activities such as extortion and

kidnapping have forced the public's and the government's attention back to the security agenda. Some of the states in northeastern Mexico where shale formations are located have experienced significant violence in recent years.

RESERVES AND PROSPECTIVE RESOURCES



Source: PEMEX Exploration and Production, 2012 and IMCO's own calculations.

Oil theft from pipelines has also become increasingly problematic in Mexico. The magnitude of the problem is unclear; estimates of oil stolen vary between agencies. However, Mexican officials have stated that between 2012 and 2013 more than 1,500 illegal fuel taps caused about \$1.1 billion in losses. Sinaloa and Veracruz are the most affected states in recent years.

There is also the issue of land ownership, community interactions and the right to exploit underground resources. There are few details in the proposed legislation in this regard. The government will play the role of mediator between companies and individuals or communities if property agreements cannot be reached. Expropriation of

the surface property is left as a last resource. However, a more systematic approach could be taken, for example, by setting minimum and maximum compensation values in every bidding round. This will surely be of the utmost importance for developing shale and other onshore projects by private companies.

The development of the energy sector in Mexico will follow a gradual approach in which the first steps include: legislation approved by Congress this summer and Round Zero results to be made public in the last quarter of 2014. Private investment (the first round of bidding) is unlikely to materialize before 2015.

V. OPPORTUNITIES FOR CANADA

CANADIAN PARTICIPATION

Trends since NAFTA

The bilateral economic relationship between Canada and Mexico has grown considerably since the North American Free Trade Agreement (NAFTA) came into force in 1994. Since then, bilateral merchandise trade increased six-fold, while Canadian investment flows to Mexico multiplied by a factor of 10.

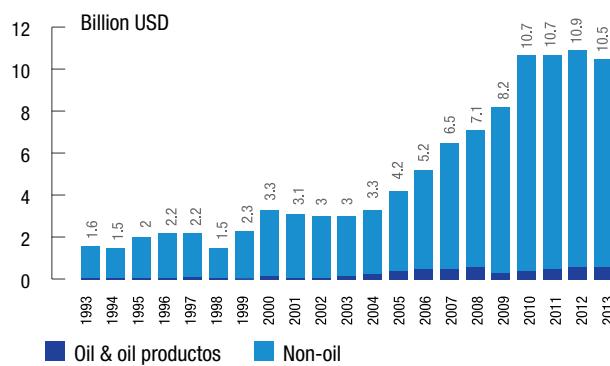
Mexico is one of Canada's most important trading partners. It is Canada's largest export market in Latin America and fifth-largest in the world (after the U.S., China, the United Kingdom and Japan). Mexico is also Canada's fourth most important source of imports worldwide (after the U.S., China and Germany) and the largest source in Latin

America. Canada is also the second largest destination for Mexican exports (only behind the U.S.), and Canadian imports are the sixth most important in Mexico (following the U.S., China, Germany, Japan and Korea).¹⁰

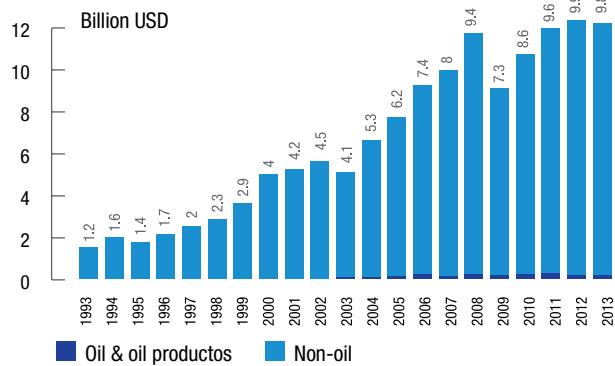
In 2013, total trade flows between the two countries accounted for more than \$20 billion US, and even though manufactured goods account for the bulk of trade, a small fraction of oil and oil products was traded (about five per cent of total trade). Particularly, Canadian oil imports from Mexico totaled \$845 million US, while it exported nearly \$13 million US worth of petroleum and petroleum products to Mexico during that year.¹¹

BILATERAL TRADE BETWEEN CANADA AND MEXICO

Mexican exports to Canada



Mexican imports from Canada



Source:

IMCO with data from Banco de México. Balance of Payments.

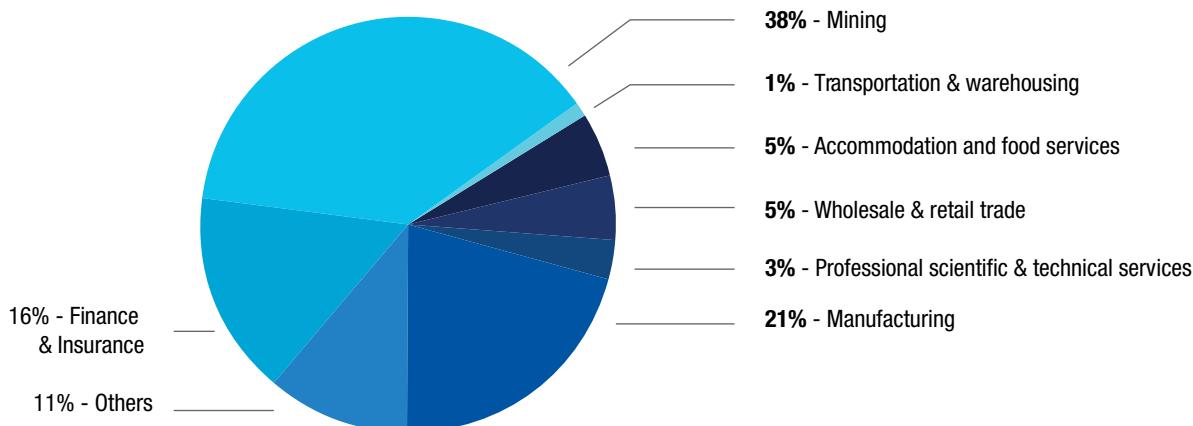
10 - IMCO's calculations based on United Nations Conference on Trade and Development, UNCTAD-STAT.

11 - Banco de México. Balance of Payments.

Canadian foreign direct investment (FDI) has also been a key factor in constructing a solid economic relation with Mexico. From 1994 to 2013, Canada's cumulative FDI in Mexico reached more than \$19 billion US, making Canada the fourth largest foreign investor in Mexico after the

U.S., Spain and Netherlands. To date, more than 3,000 firms have been registered in Mexico as having Canadian capital¹². As the following chart shows, most of these FDI flows were directed to Mexico's mining sector, followed by manufacturing and finance and insurance activities.

CANADA'S FDI BY SECTOR (1999 - 2013)



Source: Secretaría de Economía (Ministry of Economy), Estadística oficial de los flujos de IED hacia México

These results demonstrate the high confidence that the NAFTA's legal framework has granted to Canadian investors to operate in Mexico. In most sectors, the trade agreement eliminated trade and investment barriers, guaranteed essential investor protection, and offered a framework for disputes settlement.

However, NAFTA contained a number of country-specific exceptions to national treatment, and the Mexican government reserved the right to prohibit foreign investment in the energy sector¹³. Yet, private investment in natural gas distribution systems has been allowed since 1995. Private investments in pipelines began in the second half of the 1990s, mainly through the participation of one of Canada's largest energy companies.

TransCanada built two of the first privately owned pipelines in Mexico (Energía Mayakan and El Bajío), has also put into operation two additional natural gas pipelines (Naranjos-Tamazunchale and Manzanillo-Guadalajara), and is working in the construction of two more (Encino-Topolobampo and Oro-Mazatlán). The company estimates that by 2016 its investment in Mexico will total approximately \$2.6 billion US¹⁴. Export Development Canada estimates that there are around 85 Canadian companies operating in the Mexican oil and gas sector.¹⁵

The opening of Mexico's energy sector could provide significant opportunities for international companies and investors involved in the oil and gas sector, energy infrastructure development and in oil-field services. Canada's strong position in the energy sector and its political, geographic and economic ties to Mexico could benefit Canadian companies across the oil and gas value chain.

12 - Secretaría de Economía (Ministry of Economy), Estadística oficial de los flujos de IED hacia México, <http://www.economia.gob.mx/comunidad-negocios/competitividad-normatividad/inversion-extranjera-directa/estadistica-oficial-de-ied-en-mexico>.

13 - Chapter 6 of NAFTA applies to energy and basic petrochemicals and reserves investment in most activities in Mexico's energy sector to the Mexican state. Source

14 - TransCanada. http://www.transcanada.com/customerexpress/docs/ml_customer_presentations/TransCanada_in_Mexico_Final_July_2013.pdf.

15 - Dawson Strategic, 2014. Opportunities for Canada from Mexican Energy Sector Reform: This Time It's Different.

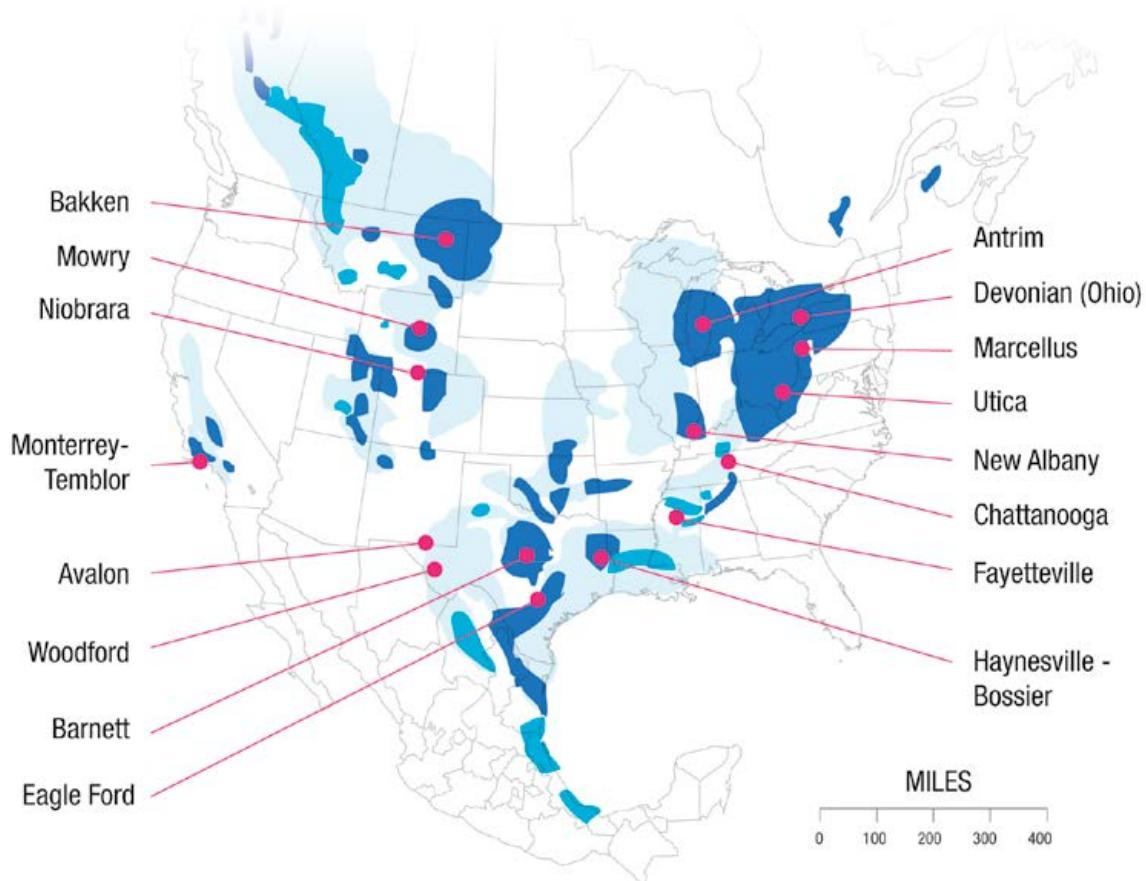
OPPORTUNITIES IN UPSTREAM

■ Shale oil and gas

We believe that one of the most meaningful opportunities for international players lies in the shale frontier. Mexico has the sixth-largest shale gas and eighth shale oil reserves worldwide according to the EIA, and two of the most productive shale basins in the U.S. extend across the border (Eagle Ford and Woodford). Furthermore, Baken and

Haynesville are analogues of plays in Mexico, and six other potential shale oil/gas plays have been identified through geological and geochemical analyses (Chihuahua, Sabinas, Burro-Picacho, Burgos, Tampico-Misantla and Veracruz).¹⁶

MAIN SHALE BASINS – NORTH AMERICA



Source:

EIA, http://www.eia.gov/pub/oil_gas/natural_gas/analysis_publications/maps/maps.htm

As has been previously noted, Mexico has important shale prospective resources¹⁷. However, PEMEX has little experience in that area (to date, PEMEX has only drilled six shale exploration wells in the Eagle Ford play). Foreign companies can bring their expertise in horizontal drilling, multistage completion and multistage fracking.

Companies that could benefit – should conditions in the bidding rounds be competitive – include service and equipment companies that could bring in rigs, fracturing equipment and horizontal drillers.

■ Deepwater potential

The deep water of the Gulf of Mexico (GoM) holds another important opportunity for foreign companies mainly from large-cap O&G's. Mexico is believed to hold considerable recoverable hydrocarbon resources of roughly 29.5 billion boe located in deep water that still have to be explored, drilled and discovered.

In spite of having significant offshore experience – mainly in shallow waters – PEMEX's deep-water exploratory campaign has only rendered 30 wells and one major discovery near the U.S. border (Perdido Fold Belt). Companies with experience operating in the U.S. GoM would have a natural advantage in this opportunity.

According to Goldman Sachs estimations, the development of deep-water and shale prospects over a 40-year horizon would require an investment of \$188 billion US for the offshore plays, and somewhere between \$662 and \$1,023 US billion for shale.¹⁸

The U.S. and Mexico recently signed a Transboundary Hydrocarbons Agreement, which provides a framework for handling potential oil reserves along the border in the GoM. This treaty will become key in the U.S.-Mexico relationship as companies start drilling for deep oil in a post-reform environment, leaving Canadian firms at a disadvantage in the GoM deep water opportunity.¹⁹

■ Services

Deepwater and shale drilling tends to be very service intensive and their development has the potential to increase demand for oil services. In turn, this could mean big opportunities for Canadian oil and gas service companies to expand their businesses, as investors will be looking for the necessary technology for oil and gas production in Mexico's onshore and offshore fields, and tap shale oil and gas reserves.

17 - According to PEMEX (Investor Relations), its shale oil and gas assessment equals 60.2 billion boe.

18 - Goldman Sachs, 2014. Mexican Energy Reform.

19 - Goldman Sachs, 2014. Mexican Energy Reform.

20 - Madrazo, Jorge and Heidrich, Pablo, 2014. Mexico's Energy Reforms: What do they mean for Canada?.

The North-South Institute.

SERVICES REQUIRED FOR SHALE AND DEEP-WATER DEVELOPMENT

Shale services	Deepwater services
Seismic, micro-seismic imaging	Seismic data collection
Rig manufacturing	Data interpretation software and services
Hydraulic fracking and horizontal drilling	Offshore drilling
Pressure pumping	Platform supply vessels and other marine services
Well completion	Helicopters
Proppant providing and transportation (sand and ceramics)	Capital equipment
Tubing and casing (OCTG)	Engineering and Construction

There are a number of market entry strategies that interested Canadian firms could ponder – and decide upon – based on their availability of capital, market confidence, expertise and risk tolerance. Some of these strategies involve:

- Establishing a joint venture or partnership with an existing Mexican technology or service sector company (or an international providing services to PEMEX)
- Developing a relationship with bidders through Canadian equity investment
- Creating a Canadian consortium of technical expertise that offers a wide range of services to prospective clients
- Providing services through a larger service sector company that already has existing client relationships (e.g. Halliburton, Schlumberger)
- Starting a brand new Mexican service sector company.

It is important to bear in mind that even though the revenue potential for the services sector may be quite large, it may take several years for it to be realized as shale and deep water plays are awarded.

OPPORTUNITIES IN DOWNSTREAM, ELECTRICITY, RENEWABLES AND OTHER

A number of Canadian oilfield service companies have made their mark in Mexico. The industry liberalization will significantly increase opportunities for small- and medium-sized exploration and production players with both international experience and expertise in unconventional resource development in shale gas and tight oil. Moreover, one of Mexico's most pressing needs is the development of its gas and liquids transport, storage and distribution network. Canadian companies' vast experience in construction and operation of pipelines will offer an advantage in this sector.

Development of major shale gas plays, both in Mexico and the U.S., should be an important driver for growth in midstream services. As domestic demand for natural gas rises and the U.S. shale gas revolution unfolds, projects for importing gas from across the border look profitable.

Another area of opportunity for Canadian companies is power generation. New legislation allows opening generation and commercialization to private investment, as well as providing open access to all market participants through an independent system operator (CENACE). Transmission and distribution will remain under state control. Contracts with private investors for the expansion and modernization of the grid and distribution infrastructure are allowed under the new legislation, as well.

OTHER CONSIDERATIONS

Mexico's advantage over other oil-producing jurisdictions worldwide for Canadian companies is its proximity to Canada, NAFTA membership and stable political climate. From a geopolitical point of view, Mexican energy reform could potentially serve as an incentive for greater North American energy cooperation between Canada, the U.S. and Mexico. This would foster energy security for the region and also has the potential to facilitate the transformation of the continent into a net exporter of energy.

These reforms will also create opportunities for advisory and technical assistance support from the Canadian federal and provincial governments, as well as for consulting firms and experts, especially in topics such as expanding the country's regulatory capacity, a matter that should attract even greater international interest.

An unintended consequence is that increases in Mexico's production would entail a more intense competition with Canadian heavy crude internationally, and most importantly in the U.S. Imports from Mexico into the U.S. are down 41 per cent over six years, while imports from Canada are up 25 per cent. If Canadian services help to rehabilitate the Mexican industry, Canadian sales expectations to the U.S. might have to be revised.

OPPORTUNITIES FOR CANADIAN COMPANIES IN MEXICO VERSUS CHINA

ADVANTAGES TO INVESTING IN MEXICO

No existing competitors:

The energy sector has been closed to competition for more than 75 years, while in China there are four large SOEs operating and dominating the market.

Access to information:

Geological information is public in most countries; in China it is treated as a state secret.

Proximity:

Seven-hour flight Calgary to Mexico (potentially 6-hour if a direct flight is opened) versus 14-hour flight to Beijing.

Time zone:

Same time zone with Mexico versus 14-hour difference with Beijing.

Language:

Mexico and Canada do not share any official languages, but do share the same alphabet, and most Mexican executives are fluent in English.

NAFTA:

Competitive advantage to Canadian investors through certainty over rules and enforcement

DISADVANTAGES TO INVESTING IN MEXICO

Size of reserves:

According to EIA, China has the largest technically recoverable shale gas resources worldwide (1,115 trillion cf), while Mexico has the sixth (545 trillion cf).

Insecurity:

Some of the states in northeastern Mexico where shale formations are located are experiencing a rise in crime and violence.

Supply chain and logistics:

Since shale and deep water resources have been undeveloped in Mexico, so have the supply chain and logistics for unconventional resources.

One operator perception:

Mexican energy sector associated to only one monopolistic operator, both in the O&G activities and in the electric power sector.

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