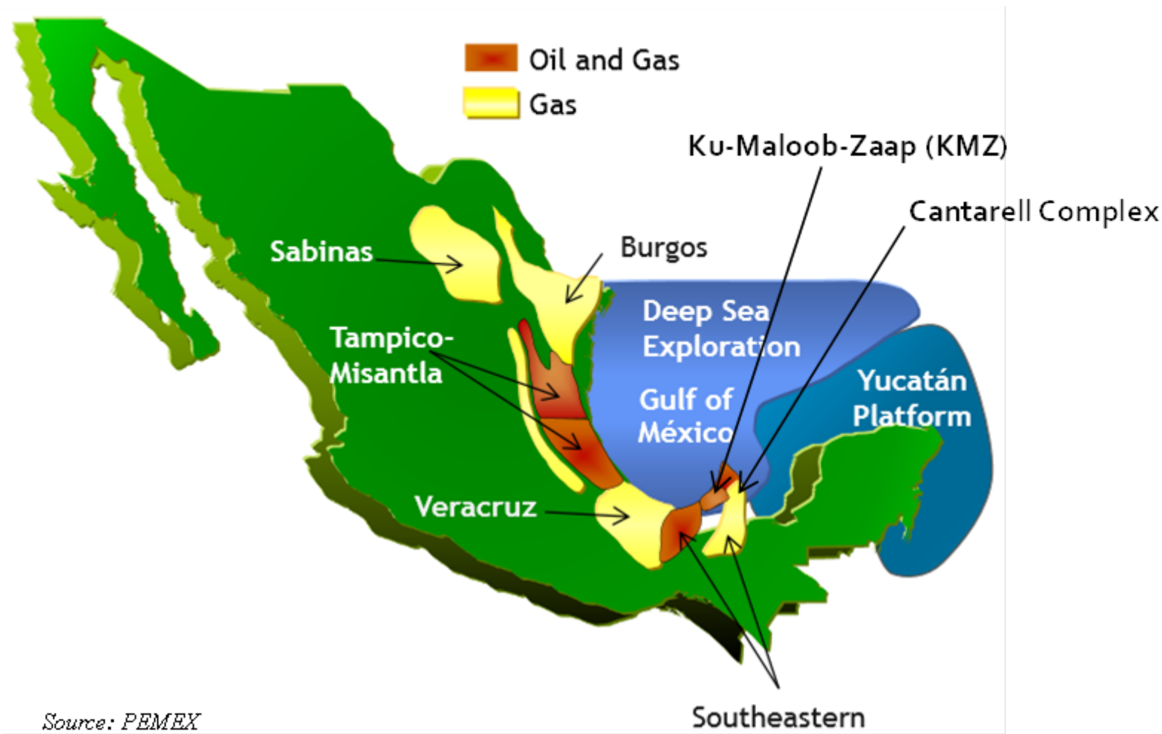
# THE STATE OF THE MEXICAN ENERGY SECTOR

### *Concerns about production declines, stagnation, and underperformance*

Crude oil production has steadily declined since 2004, down by nearly 1 million barrels per day (bpd) over the past 10 years. The period from 2004 to 2009 was marked by especially rapid loss due to high decline rates in the super-giant Cantarell field. Recent reductions have been more gradual, but the downward trajectory will not be easily reversed given the maturity of Pemex legacy oil fields and the high concentration of production in a small number of fields. In the short to medium term, the next two to five years, production will most likely remain close to current levels. The stability of the Ku-Maloob-Zaap super-giant field, which has plateaued at 850,000 bpd, will be critical if Mexico is to maintain output levels over this period, yet significant risks exist relating to its pattern and rate of decline.



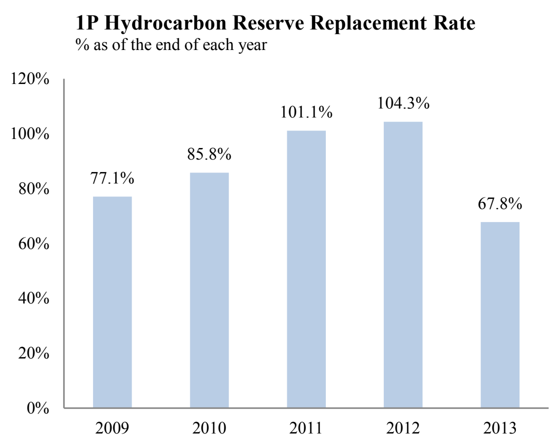

Additionally, there are now concerns about official production figures as oil balances cannot account for close to 150,000 bpd of total Mexican crude production. It is assumed that the water cut in some fields is advancing, and part of the water that is being produced is counted as crude.[1] If this is the case, production in April was not 2.48 million bpd, as

[1] CNH, http://www.cnh.gob.mx/_docs/Reportes_IH/Produccion_y_Distribucion_de_Aceite_Mar_2014.pdf and Pemex, Base de Datos Institucional, April, 2014.

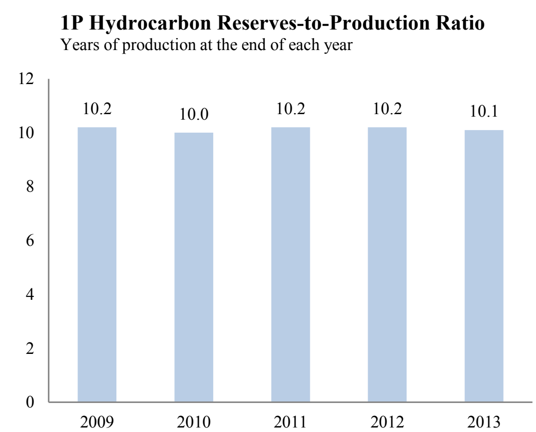
reported by Pemex, but closer to 2.35 million bpd, further exacerbating Mexico's oil revenue problems.

Against this backdrop, Pemex and the Mexican government have set an ambitious production target of 3.0 million bpd for 2018. The probability of attaining this goal appears to be close to zero. A detailed bottom up analysis of the 25 largest fields, ranked in terms of remaining reserves, does not identify sufficient incremental net production gains that would allow Pemex to reach this target and recent presentations to investors do not identify which specific fields will add volumes.[2]

Proved reserves estimates at the end of 2013 do not provide added comfort.[3] The reserve replacement ratio (RRR) for 2013 was 67 percent, down from 106 percent in 2012. 2009 to 2012 period it averaged of 85 percent. The reserve to production ratio is now down at 10.7 years, as production continues to decrease. Unpublished 2P (proven and probable) and 3P (proven, probable, and possible) reserve estimates for 2013 might also turn out to be lower. Overall, Pemex delivery has been consistently disappointing and clearly is below its own expectations.




Source: PEMEX




Source: PEMEX

The natural gas sector has also been struggling. Net production has remained essentially stagnant over the last three years and marketable output of dry gas has declined gradually. Despite these recent trends, Pemex forecasts an increase of 40 percent from 2013 to 2018, which is twice the rate of growth it has projected for crude oil. Additional volumes

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2 Pemex, Presentation to Investors, April, 2014, p. 18, http://www.ri.pemex.com/files/content/Investor Presentation_e_140331.pdf.

3 U.S. Securities and Exchange Commission, Pemex, Annual Report, Form 20 F, 15/05/14, p. 35-38 .

of non-associated gas are expected from deepwater off the southern coast of Veracruz, associated gas from shallow waters in the coast of Tabasco state, and, later in this period, shale gas from the north of Mexico. Proven reserves have been declining. The average RRR was 95 percent in the period from 2008 to 2012, but it declined to 71 percent in 2013.[4]

Mexican government revenue forecasts to 2018 assume the Pemex crude oil production targets are achieved and that prices are relatively stable. These incremental revenues would allow a gradual reduction of government take as Pemex transitions from the current licensing regime to the new contractual one proposed in the reform. However, if these revenues do not materialize, the government will be hard pressed to offer any relief and some reform initiatives could be slowed. Most at risk would be projects Pemex would want to farm-out and which would clearly need lower tax and royalty rates to draw foreign investment. This situation is further affected by the fact that under the new contractual framework, government revenues tend to be back-ended. Proposed signature bonuses, surface rental fees and royalty rates are low and government revenues from production will be delayed due to the high volume of "cost oil," which goes to producers to pay off initial investments in production and profit sharing agreements.

### *Growing U.S. and Canadian oil output to displace Mexican imports*

Exporting crude into Pemex's traditional foreign market, the U.S. Gulf Coast, has become increasingly difficult. Net liquid hydrocarbon exports plunged from a 1.8 million bpd in 2003 to less than 800,000 bpd a decade later. This was primarily due to the dramatic fall in production and a modest increase in domestic refining requirements, mostly of heavy Maya crude. More recently, its light and extra-light crudes – Isthmus and Olmeca -- have been displaced in the U.S. Gulf Coast by rapidly growing U.S. production of crude grades of similar quality. Currently, only a modest volume of these Mexican crudes flow into the region, and eventually these volumes are expected to dry up.

However, it is Maya crude that is now at risk as competition from other heavy oil intensifies. Increasing volumes from Canadian heavy oil should displace Venezuelan and Mexican crudes as the transport infrastructure expands. Growing volumes are flowing to the Gulf from Alberta by rail. Pipeline capacity is being developed or reversed to deliver Canadian crude to the region, including the Seaway pipeline, and more increases are

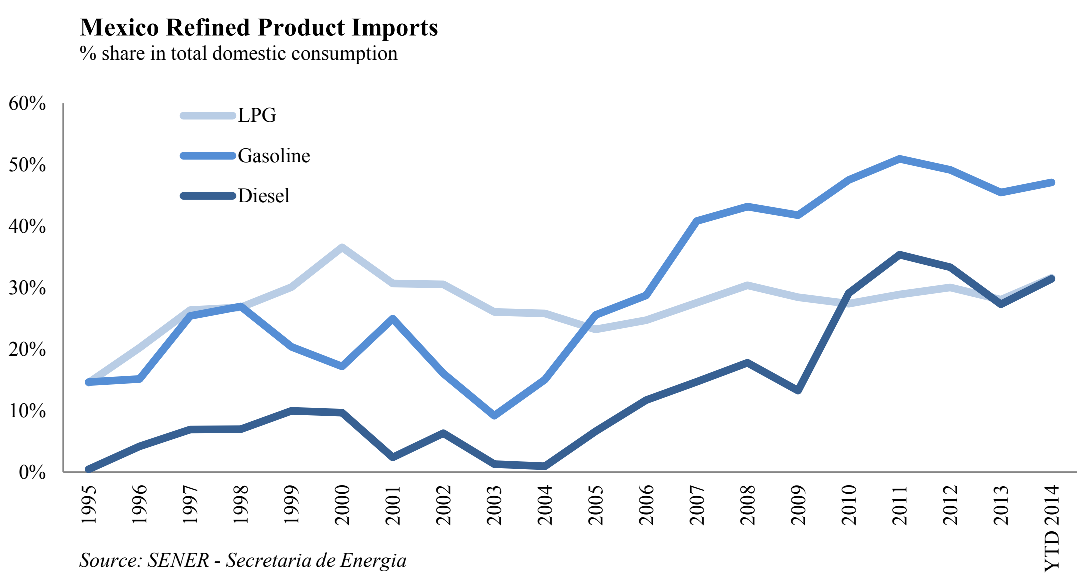
[4] Ibid., p.36.

expected in 2015. The potential displacement from the proposed Keystone XL pipeline is even greater.

The substitution of Venezuelan and Mexican crudes will trigger vigorous competition for market share in the U.S., and later in Asian markets. Canadian heavy oil faces limited export options and are effectively limited to the United States, and producers will have to discount their crude to levels where it will clear in the Gulf Coast. As Canadian heavy oil differentials drop, so will those for competing heavy barrels from Mexico and Venezuela, to the level where it is more profitable for them to go to Asian markets. Deep conversion capacity in Chinese and Indian refineries could struggle to accommodate additional heavy crude volumes being displaced from the U.S. Gulf Coast, causing differentials to weaken further. Producer profits would suffer under these conditions as crude they export would have to be discounted until it was cleared into the market. These are not issues that reform can solve, but they must be considered during the lawmaking process due to the potential impact on Mexico's oil revenues. Mexico could develop contractual arrangements with U.S refiners that link imports of U.S. gasoline and diesel and exports of heavy Mexican crude. This might offer some temporary market share protection.

### *Midstream and downstream reforms needed as imports grow*

Mexican imports of gasoline, diesel, LPG, and natural gas have been growing rapidly, due to refining capacity constraints and badly managed Pemex refineries, while, as mentioned, natural gas production has remained flat.



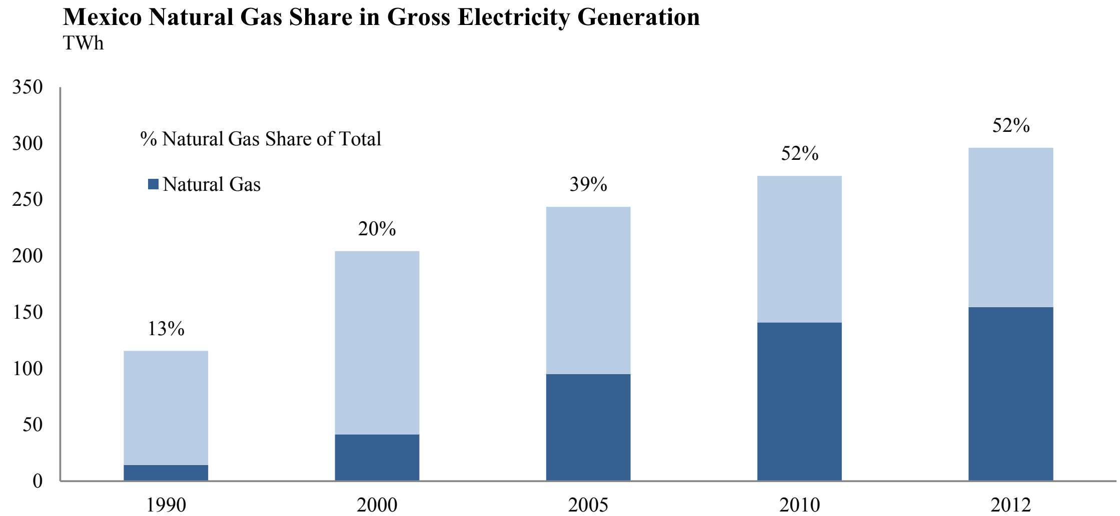
In the case of natural gas, one third of the domestic requirements of dry gas are imported, and this share will continue to grow in the short- and medium-terms, given the construction of new pipeline capacity and the development of under-served and new, emerging local markets. The growth of industrial and electricity demand will accelerate, due to lower prices. In the industrial area of Monterrey, for example, the wholesale price will closely track Henry Hub pricing.

Oil product imports will also expand, albeit at a lower rate, with the expected recovery in economic growth. The elimination of fuel subsidies, as well as an increased yield of light products through changes in crude slates and the reconfiguration of existing refineries, can help reduce the growth of imports. However, the market share of product imports is already very high, with gasoline imports accounting for 47 percent of domestic sales in the first four months of 2014, while diesel imports supply 31 percent of demand.

In the near future Mexico will have to carry out significant investments in mid-stream infrastructure to meet the demand for imports. Port facilities, terminals, storage capacity, and oil product pipelines will have to be built. The natural gas pipeline construction program must also advance rapidly, as well as their interconnection facilities to appropriate U.S. hubs. This will allow Mexico to fully benefit from available low-cost supply and take advantage of unique logistical advantages.

However, in the longer term, growing import dependence poses significant security of supply issues. Refinery capacity in Mexico cannot expand economically due to the ample excess capacity in the U.S. Gulf Coast. Under these conditions, the cost of building greenfield capacity in Mexico is a multiple of the acquisition cost of existing U.S. refineries in the Gulf Coast. Moreover, three of Pemex's refineries – Salina Cruz, Tula, and Salamanca -- urgently need to be reconfigured and deep conversion capacity put in place in order to eliminate a surplus of high sulfur fuel oil production that is land locked and cannot be economically exported. As the gasification program advances, natural gas will fully displace fuel oil in power generation. This is problematic because pipeline construction is moving ahead much faster than the installation of coking capacity.

Another long-term issue will eventually arise regarding the consumption of natural gas. In 2012, the use of natural gas in electricity generation passed the 50 percent threshold and this share will continue to expand rapidly as the pipeline grid is extended and new power plants are built. Initially, the increased use of natural gas both as a baseload fuel and in support of wind power generation cut carbon emissions. Eventually, however, new technology will be required to eliminate lower emissions from natural gas, given the overriding need to reduce the carbon intensity of the Mexican economy.




*Source: IEA*

### *Deepwater and unconventional oil potential promising*

Longer-term prospects in Mexico's unconventional and offshore areas look promising, but currently require expertise and financial strength of international oil companies. Deep-water and ultra deep-water exploration in the Gulf of Mexico and the development of unconventional resources in northern Mexico and in the Chicontepec basin could reverse the current oil and natural gas production and reserve trends.

The pace of production growth after 2018 will depend largely on the outcome of the reform initiatives as well as the exploration and development strategies that will be followed in the coming years. It is still early for credible new medium-term forecasts based on unproven reserves, prospective resources, and investment flows that are difficult to predict at this stage of the reform process. Inflection points in investment flows, reserves, and later in production, must be identified. Converting prospective resources to proven reserves and then to production is a risky and lengthy process, particularly if the existing reserve endowment is mature.

The flow of private investment to the oil industry will take time to build up. The Mexican government must first select the blocks that are available for bidding and the assets that Pemex will be allowed to farm-out. Farm-out agreements would allow foreign partners to take a stake in an exploration or production project with Pemex in exchange for taking on capital expenditure and operating costs. It must design new contractual arrangements and adopt contract-specific bidding criteria. The upstream regulator also needs to develop the necessary infrastructure before inviting and assessing bids, and allocating exploration and production blocks. Simultaneously, it must put in place a new regulatory framework. Given the experience of other countries that have opened their upstream, this process will be neither quick nor easy if it is going to be done well. It is unrealistic to believe that any materially significant production sharing contracts can be signed in the first half of 2015. However, the government needs to show some early progress. It has signaled that its priorities lie in the exploration and development of unconventional resources, as well as ultra-deep waters close to the U.S. maritime border. These areas require hard work and major investments before significant production can be achieved. Safety and environmental regulations, comparable to the ones that now prevail in the waters off the U.S. Gulf Coast, will have to be established and enforced to draw private investment.