



# Mexican Energy Reform

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*Center on Global Energy Policy*

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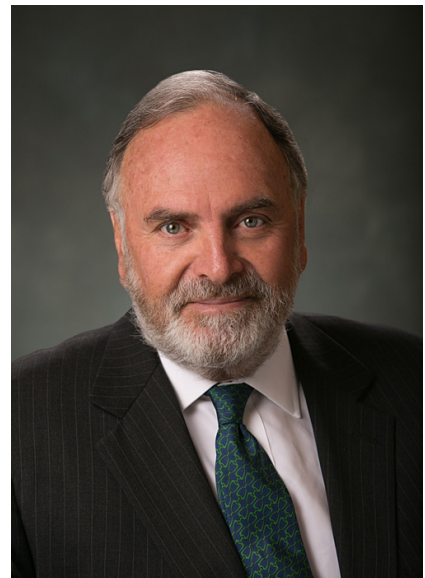
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*Adrian Lajous*

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## *Executive Summary*

**Mexico's energy reforms provide a historic opportunity to revitalize its ailing energy sector and bolster the overall economy. No Mexican assets will be privatized, but the nation's vast oil resources, including offshore and unconventional fields, will be opened to international companies. Still, many important, specific details of the reforms have yet to be addressed.** Pemex will give up its monopoly status but will remain the dominant player in the oil sector. Offshore deepwater areas have generated excitement abroad, as has the potential for unconventional development in the north and in the Chicontepec region. Development of these areas will benefit from the technological expertise and deep pockets of international oil companies.

**Important secondary and enabling laws are being discussed in congressional committees now, and the government wants them approved by end-June. Given the long-term importance of these laws and their complexity, a deeper review would be preferable.** This proposed legislation gives greater detail to structural changes and sets the stage for policy and strategy developments in the hydrocarbon and power sectors. Current discussions are taking place in an extraordinary congressional session. Allowing time for a fuller discussion might delay final approval into the summer, but it could be done before the next ordinary session at the beginning of September.

**Steep drops in oil production over the past 10 years and weak GDP growth are driving the need to open up the energy sector.** GDP growth has declined from 6.4 percent in the period from 1950 to 1980 to 2.4 percent between 1980 and 2010. Mexican oil production has slumped by over 1 million barrels per day since 2004, driven by decline in the giant Cantarell field. At the same time, Mexico will face increasing competition from Canadian heavy oil in the U.S. Gulf Coast, which could allow it to market Maya crude to Asia at a discount. Ambitious government production growth targets of 3 million bpd in the medium-term will be difficult to achieve, and the more likely scenario is that production will remain flat. Offshore and unconventional developments offer longer-term solutions to achieve growth.

**Reforms in the power generation sector, which have attracted less attention, will also be critical for economic growth, including manufacturing.** Mexico's manufacturing sector pays

high electricity prices relative to costs in other countries. Bringing these costs down is essential to improving Mexico's overall economy, but key issues around the market structure have yet to be addressed.

**Mexico's midstream has suffered after years of underinvestment by state companies, but no assets will be privatized.** Transport constraints due to pipeline bottlenecks have provoked a natural gas supply crisis and inadequate transport and storage capacity has increased the risk of supply interruptions in oil products. It is not clear how these problems will be solved.

**Reform of the retail fuel market will be gradual.** Monthly increases in pump prices will begin in 2014, with the aim of connecting to international market prices by 2020. Pemex retains the sole right to import fuel until 2018. The time frame is quite long and could be sped up. Treasury continues to be involved in setting prices, although could be delegated to the Energy Regulatory Commission as is the case with other regulated products and services.

## BACKGROUND

### *Historic reforms aim to revitalize Mexico's energy sector and bolster the economy*

Mexico has launched an ambitious transformation process that should bring to an end long-standing and entrenched state monopolies in its energy sector. The constitutional amendments of December 20, 2013 establish new industry structures in oil, natural gas, and electricity. Competition will be introduced in refined product and electricity markets, and private investment will flow into various segments of these industries, particularly in upstream oil and gas. The state will maintain ownership and control of subsoil hydrocarbon assets, and both Pemex and the Federal Power Commission<sup>1</sup> will remain dominant industry actors, wholly owned by the state. None of their existing assets will be sold to private parties.

The establishment of a new oil regime, with its own rules, institutions, players, patterns of engagement and policies, as well as the development of a centralized wholesale electricity market, constitutes a challenge that goes well beyond the more limited priority of mobilizing direct foreign investment to the energy sector. Reforms will require a concentrated and sustained effort, and a well-structured implementation strategy. There are still many unresolved issues that require specific solutions, some of which may be politically costly. The government must now transmit a clear sense of direction, articulate a rigorous sequence and timing of its reform agenda, and maintain the flexibility to adjust to the unintended consequences that its actions are bound to trigger.

## REFORM DRIVERS

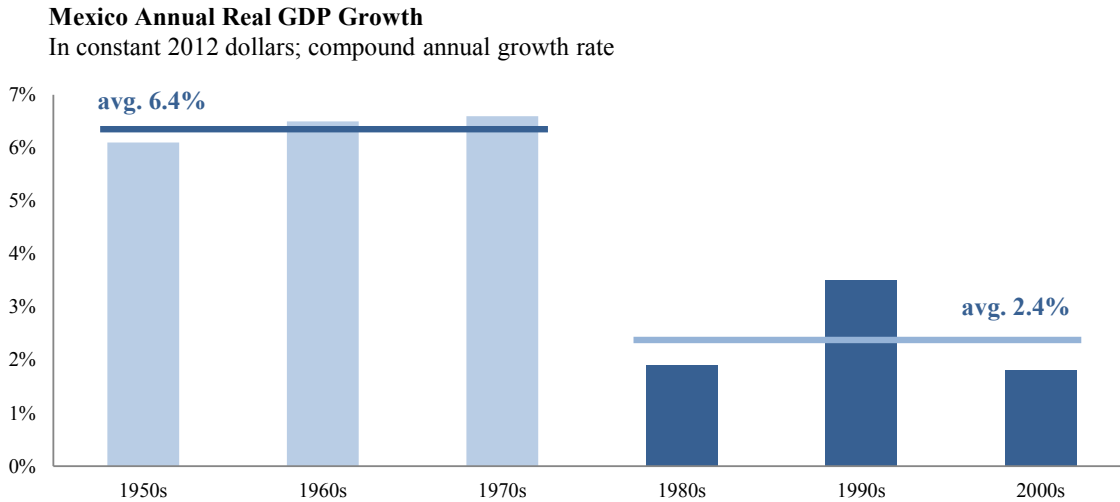
### *Broader economic needs coupled with industry stagnation and structural challenges spur reform*

Energy reform is part of a wider set of sectorial reform initiatives of the Peña Nieto Administration. All of them respond to the urgent need to increase the rate of economic growth and improve productivity. Performance over the last thirty years has been disappointing with respect to its own history and relative to other middle-income countries. After growing from 1950 to 1980 at an average annual rate of 6.4 percent, GDP grew from 1980 to 2010 at a rate of 2.4 percent. More recently, average growth has been even slower. Notwithstanding the increasing flow of direct private investment, gross fixed capital formation has remained stagnant as a proportion of GDP, at levels just above 20 percent. Insufficient investment in public goods is the source of serious bottlenecks in physical and social infrastructure, and effective non-oil tax ratios are particularly low, even by Latin

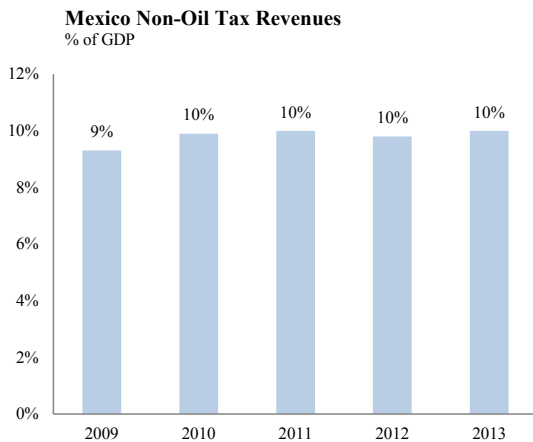
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<sup>1</sup> Comisión Federal de Electricidad (CFE).

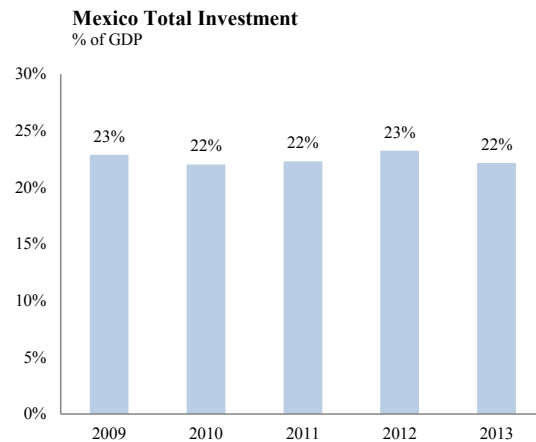
American standards, at less than 10 percent of GDP. Maintaining macroeconomic balances has resulted in a severely capital constrained state-owned energy sector. It is thus not surprising that a poor state tends to have poor state-owned capital-intensive energy companies.



Source: McKinsey Global Institute, IMF



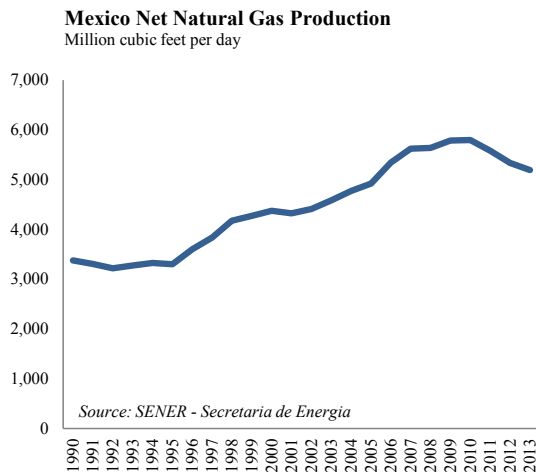
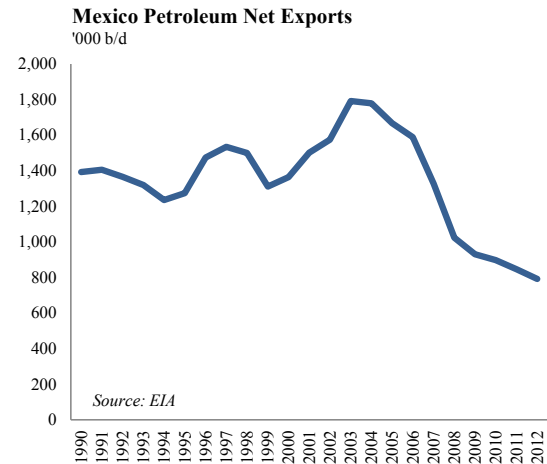
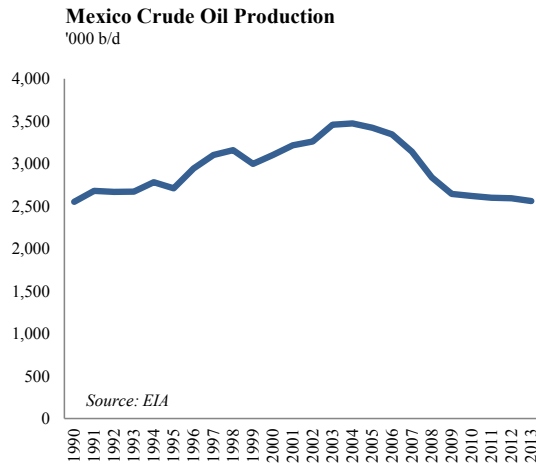
Source: IMF



Source: IMF

Other more immediate drivers of energy reform have been the dramatic fall in crude oil production and exports in the context of the recent expansion of oil and gas production in the rest of North America. Net domestic natural gas production has been stagnant for some time. The resulting increase in imports has been insufficient to meet demand due midstream problems,

specifically pipeline capacity constraints, which have provoked a serious natural gas supply crisis. Uncompetitive electricity costs and prices are limiting the growth of manufacturing. More generally, a sense of crisis prevails in the energy sector, particularly in the oil industry, where governance issues are blamed for underperformance.



Secondary legislation and enabling law initiatives that relate to the energy sector were sent to Congress on April 30<sup>th</sup>, as ordinary sessions were ending. They are being discussed in committees, and the government seeks to have them approved by the end of June, in an extraordinary congressional session. The proposed legislation gives greater granularity to the desired structural changes and sets the stage for policy and strategy developments in oil and electricity. The new laws seek to reform the energy sector by:



- Redesigning existing institutions, as well as the creation of new ones
- Curtailing and substituting direct government intervention with regulation
- Strengthening the role and independence of regulators
- Establishing independent system operators to manage transmission, transportation and distribution grids, and,
- Proposing new governance structures and processes for Pemex and CFE

The entry of new industry players requires that basic decisions with respect to these issues are clear and explicit.

This paper discusses the objectives, the scope, the depth, and the timing of energy reform. It argues that a more realistic assessment of medium-term domestic oil and natural gas production prospects is required. The expected growth of oil product and natural gas imports, primarily from the U.S. Gulf Coast, are part of the shifting North American energy reality that must be analyzed and fully understood in developing reforms, as imports are bound to play a key role in creating a more competitive market environment in Mexico.<sup>2</sup>

The paper outlines the complex issues that are posed by the proposed upstream oil and fiscal regime as well as the challenges of the changes in midstream electricity, natural gas, and liquid hydrocarbons sectors. The speed of refined product and electricity liberalization is addressed, particularly in the case of automotive fuels.

Finally, the importance of reform of the electricity sector for manufacturing and the wider economy is stressed. The oil upstream proposals have generated a great deal of attention, but reducing costs, tariffs, cross subsidies, and expanding the transmission and distribution grids could have a more direct and immediate impact on the competitiveness of Mexican industry.

The paper concludes that a deeper congressional review of several reform measures would ultimately bolster the process and ensure that Mexico reaps the maximum benefits. In addition, a more democratic approval process would add to its legitimacy and strengthen public opinion. Allowing time for a fuller discussion might delay final approval into the summer, but it could be done before the next ordinary session at the beginning of September.

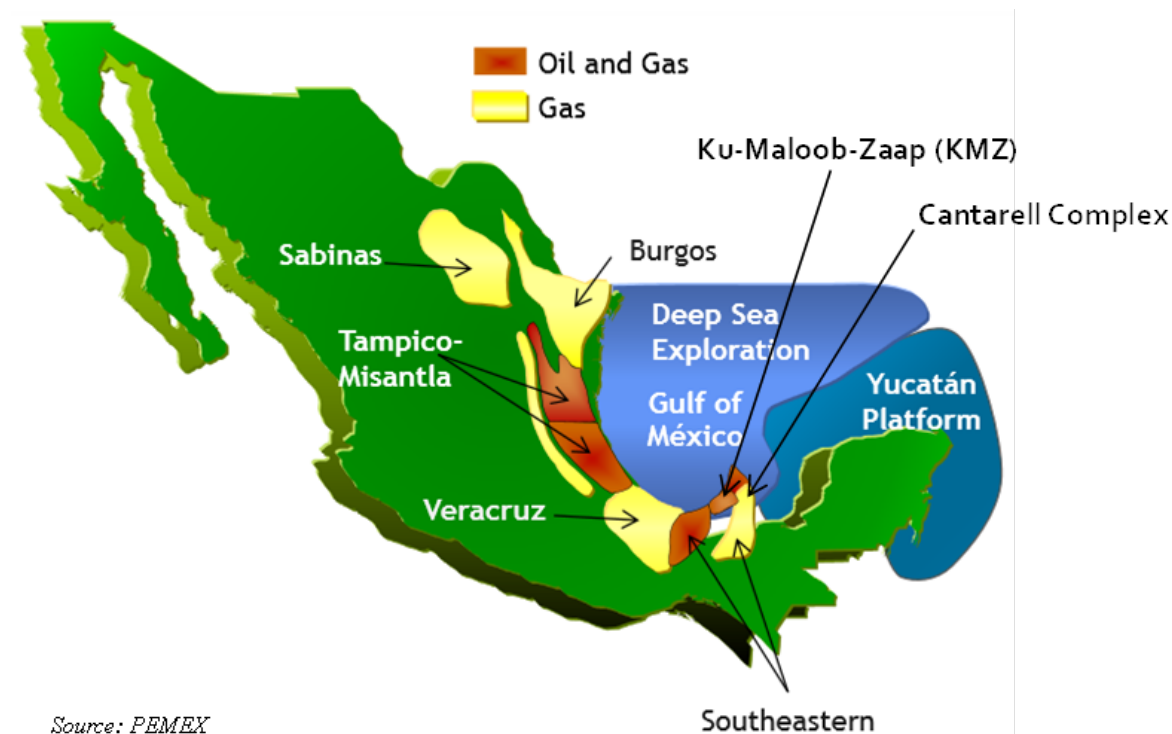
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<sup>2</sup> Adrian Lajous, Exportaciones de petróleo crudo de Estados Unidos a México, *Foro Internacional*, Vol. LIV, julio-septiembre, núm 3.

## 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.

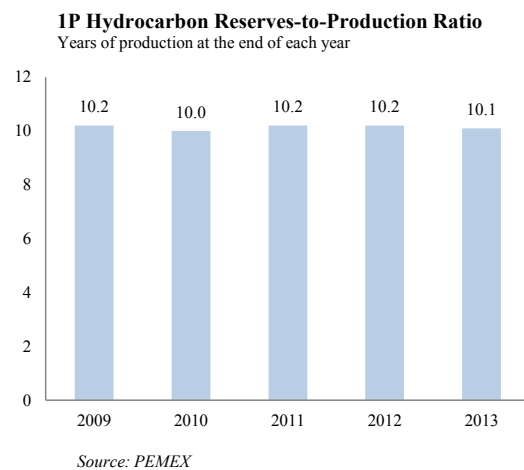
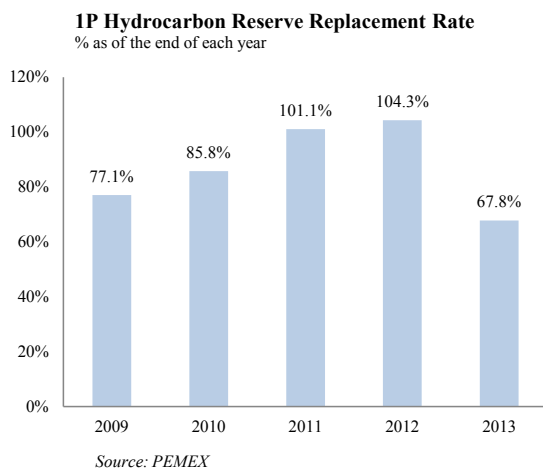


Additionally, there are now concerns about official production figures as oil balances cannot account for close to 150,000 bpd of total Mexican crude production. It is assumed that the water cut in some fields is advancing, and part of the water that is being produced is counted as crude.<sup>3</sup> If this is the case, production in April was not 2.48 million bpd, as reported by Pemex, but closer to 2.35 million bpd, further exacerbating Mexico's oil revenue problems.

<sup>3</sup> CNH, [http://www.cnh.gob.mx/docs/Reportes\\_IH/Produccion\\_y\\_Distribucion\\_de\\_Aceite\\_Mar\\_2014.pdf](http://www.cnh.gob.mx/docs/Reportes_IH/Produccion_y_Distribucion_de_Aceite_Mar_2014.pdf) and Pemex, Base de Datos Institucional, April, 2014.

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.<sup>4</sup>

Proved reserves estimates at the end of 2013 do not provide added comfort.<sup>5</sup> 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.



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 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

<sup>4</sup> Pemex, Presentation to Investors, April, 2014, p. 18, [http://www.ri.pemex.com/files/content/InvestorPresentation\\_e\\_140331.pdf](http://www.ri.pemex.com/files/content/InvestorPresentation_e_140331.pdf).

<sup>5</sup> U.S. Securities and Exchange Commission, Pemex, Annual Report, Form 20 F, 15/05/14, p. 35-38 .

been declining. The average RRR was 95 percent in the period from 2008 to 2012, but it declined to 71 percent in 2013.<sup>6</sup>

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 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

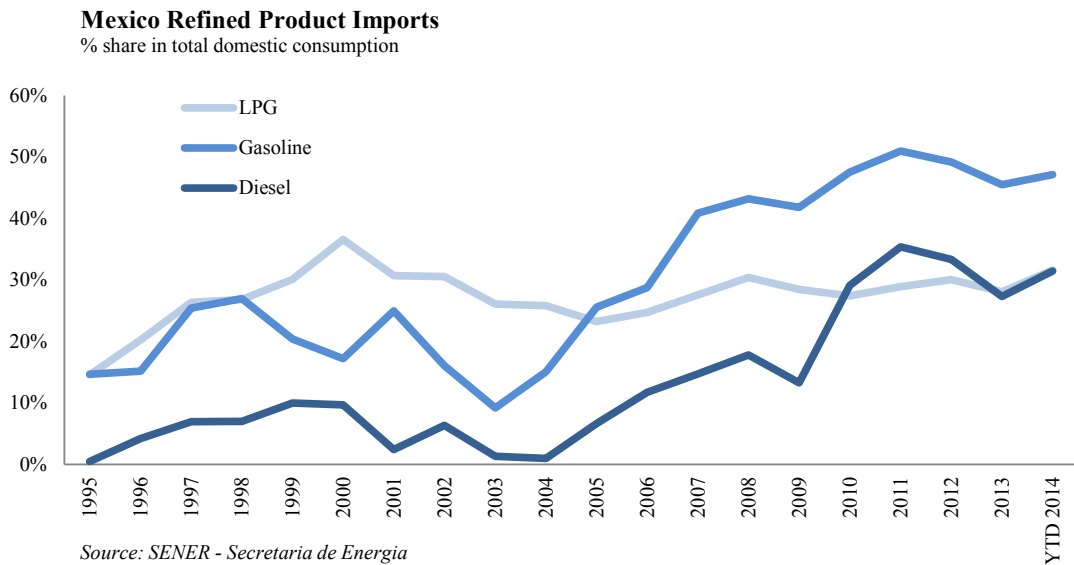
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<sup>6</sup> Ibid., p.36.

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

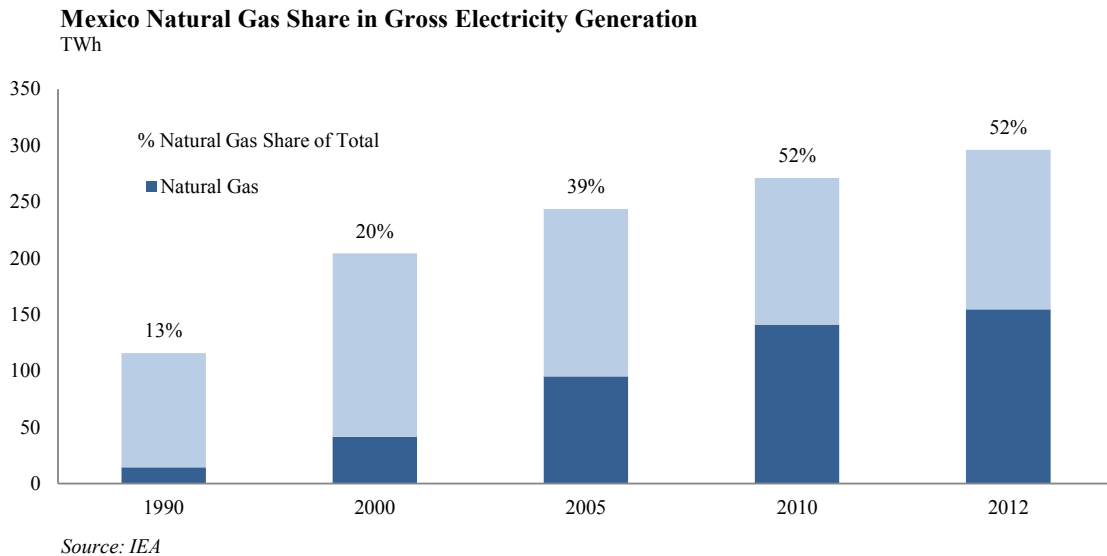
growth of industrial and electricity demand will accelerate, due to lower prices. In the industrial area of Monterrey, for example, the wholesale price will closely track Henry Hub pricing.

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.



***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.

## UPSTREAM REFORM

### *Round Zero, which deals with Pemex legacy assets, already underway*

The opening of the Mexican upstream to private investment will be a multi-stage, complex process. The first stage – known as Round Zero -- began in March and should be completed by September 17<sup>th</sup>. It deals with the selection and allocation of assets that will be transferred to Pemex under the new legislation. Pemex has already presented its formal request of oil and gas licenses.<sup>7</sup> The list of fields and exploration areas was not made public, but can be inferred from the guidelines contained in the constitutional amendment<sup>8</sup> and from descriptive statistics that it published. The amendment establishes that Pemex may keep all fields that were producing on December 20, 2013, after presenting new development plans, and exploration acreage where Pemex has made commercial discoveries or made significant investments.

In the second case, on the basis of its work plans and evidence of its financial capacity, Pemex may carry out activities for 3 years, with a possible two-year extension. If successful, Pemex can then proceed to their development if it can demonstrate that it has the necessary technical, financial, and execution capabilities to explore and produce these hydrocarbons in an efficient and competitive manner. The government has not yet proposed explicit criteria that will be applied, but has formally detailed an extensive request for information.

The Pemex proposal leaves ample space for private investment in shale oil and gas in Northern Mexico, in tight sand and low energy reservoirs in the Chicontepec area in the State of Veracruz, and in deep-water areas in the Gulf of Mexico. Specific assets in other regions are not

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<sup>7</sup> Asignaciones.

<sup>8</sup> Transitional Article 6.



excluded, but their availability is not been made public. Mexico's Department of Energy<sup>9</sup> has offered to authorize uncontested assets as soon as possible and address what would probably be marginal cases toward the end of the process. As the deadline approaches, a certain amount of tension is bound to arise between Pemex and the government during the discussion of undecided assets. One outstanding and critical issue is the definition of the size of the blocks that will be formed for purposes of asset bidding and the allocation of contractual areas.

Once the Pemex licenses are ratified in Round Zero, a second two-phased process begins. In one phase, Pemex legacy licenses will transition to new contractual and fiscal arrangements. In the other phase, contractual areas will be allocated to private parties through a well-defined public bidding mechanism. Pemex may also participate. It is not yet clear which phase will come first. It is assumed that the Pemex transition would come first, since new Pemex contracts could then form part of alliances and associations with third parties. However, the difficulties involved in this transition and the formation of these alliances might take more time than the establishment of a totally new joint operating agreements in assets that will be openly available. Valuing Pemex's initial asset contribution and segregating this value from what is contributed by its partners will not be easy tasks. There are many other issues that may arise, including the role that the Pemex trade union will play in these the partnership.

#### *Four types of contracts to be available through a two-stage bidding process*

The constitutional amendment explicitly prohibits concessions. Four types of contractual arrangement were initially proposed: service contracts, profit and production sharing agreements, and license contracts. Service contracts may include various forms of incentives and are paid in cash. Profit and production sharing agreements are very similar. Their main difference is that in profit sharing, title to production never passes to the contractor. The government sells the oil and gas produced and the proceeds go to a fund<sup>10</sup> that pays the contractor for the costs incurred and its share in the profits. Otherwise, these appear to be standard contracts used by the international oil industry, which allow for the booking of reserves. So-called license contracts are similar in structure to concessions, but will probably follow the Peruvian model<sup>11</sup> that simply alludes to contractors and not to concessionaires in its contractual clauses. Although the proposed hydrocarbon law refers to

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<sup>9</sup> Secretaría de Energía (Sener).

<sup>10</sup> Fondo Mexicano del Petróleo para la Estabilidad y el Desarrollo.

<sup>11</sup> Petroperú, contratos de licencia.

these contractual models and describes some of their basic terms and conditions, the Department of Energy and the Treasury<sup>12</sup> have not yet drafted standard contract forms and are probably waiting for the relevant secondary laws to be passed. Nor has the government offered guidelines with respect to the type of contract that will be applied to specific resources and geographical areas.

All of these contracts, with the exception of those relating to trans-border reservoirs, will be subject to a two-stage public bidding process. In the first stage, bidders will be selected on the basis of their qualifications, financial strength, work program, and minimum investment commitment. In the second stage, only one variable will be considered: the government's share in net income. However, in one variant of license contracts – the one that will probably be used for shale exploration and development -- the share in terms of gross income is considered. A high premium is placed on contractual simplicity. Bidding will be on a contract that leaves little space, if any, for negotiation. This is essential given the public mistrust that prevails with respect to the opening of the energy sector and the deeply embedded corruption in its activities. The government wants to minimize discretion in the decision making process in order to ensure full transparency in assigning contracts. It is aware that this might erode some of the benefits of a well-negotiated outcome. However, it is even more sensitive to potential scandals in these matters that could derail the reform effort. Responsibilities are well defined: the Department of Energy will design contracts, the Treasury will set their economic and fiscal terms, and the regulator (CNH) will run the bidding process. The same provisions and basic processes will be applied to associations related to Pemex contracts.

Acquiring joint venture partners through bidding is an awkward procedure, but centralizing this process in the government is the best way for Mexico to guarantee transparency in high value Pemex transactions.

Other complex issues are related to the specific form that these alliances and associations will take. As the government has strongly expressed that reforming the energy sector precludes the privatization of existing assets, it might opt for some form of farm-out agreement in which the foreign partners would acquire an interest in a Pemex exploration or production contract and would carry its capital expenditure and operating costs. The international company would also be the operator. The other form of alliance could be a standard joint-operating agreement. In this case, the

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<sup>12</sup> Secretaría de Hacienda y Crédito Público (SHCP).

new partner(s) could acquire an interest in an existing contract in exchange for an agreed consideration, and this could easily be construed as a partial sale of an asset.

The government may use the new Pemex contracts in two different ways, at two different times. Initially, it might want to modulate the speed of the transition from existing licenses to new contracts. This is important, as this migration will imply a lower government take. In this phase it might also want to concentrate on bidding out exploration acreage that is not under Pemex control. Later, the government could opt to open up Pemex legacy assets to the managerial discipline that partnerships would impose. This would allow additional time for the institutional developments that are needed for the success of these alliances and associations.

The government take on legacy assets will remain the same. It is only when Pemex migrates from existing licenses to contracts that the government take will be reduced. This is a powerful incentive for Pemex to make this transition to contracts as rapidly as possible. However, the actual migration will be moderated by government cash flow requirements, and it is the Department of Energy and the Treasury that hold the key of the process. The contracts to be used by Pemex and by new players set low signature bonuses and area rental fees, and very low royalty rates, with the government basically receiving revenues later in the life of the project based on the net income of ring-fenced contractual areas. This contrasts with short and mid-term government cash requirements. Bonuses only apply to license contracts and not to production sharing contracts. The amount of bonuses will be set by the Treasury, not by the contractor, on a case-by-case basis, before bidding begins. The Treasury has already signaled that they will represent a small fraction of expected project revenues. It is the government that sets them because it wants to evaluate bids on one single variable.

More intriguing is the level of royalties. A progressive scale is applied for oil, such that when prices are under \$60 a barrel, they will be set at 5 percent. A formula of  $([0.125 * \text{oil price}] - 2.5)$  kicks in when prices are above \$60 a barrel, such that at \$100 a barrel, the royalty rate would be 10 percent.

For non-associated gas, the royalty is zero at \$5 per million British thermal unit. When prices are between \$5 and \$5.50 per mmBtu, the following formula applies:  $[(\text{price of natural gas} - 5) * 60.5] / (\text{price of natural gas})$ .

Above \$5.50, this formula will be used: (price of natural gas) /100, providing a royalty rate of 7 percent for gas prices at \$7 per mmBtu. Royalties for associated natural gas were simply set at: (price of natural gas/100).

The argument given by the Treasury for these low rates is that investment decisions based on taxes from gross revenues can distort investor decisions while taxes based on net profits do not. It is difficult to estimate the cost of potential distortions. Meanwhile, the Treasury is giving up assured revenues as production begins from royalties that can be easily estimated and monitored. However, there is a big difference relative to the oil royalty rates in other countries. For example, in Texas it is 25 percent, and offshore in the U.S. Gulf coast it is 18.75 percent. Although Norway and the U.K. have abolished royalties in their concessions, they did so when oil production in the North Sea was declining. Norway, in particular, does not require up front revenues given the size of its sovereign wealth funds.

The government faces difficult dilemmas in the choice, sequence, and timing of the assets to which it hopes to attract private investment. It has to find the right mix of frontier exploration assets, unconventional service intensive resources, marginal mature fields, and rich low cost shallow water developments. How government proceeds will give insight its priorities. High cost, high-risk projects with long lead times will not offer the government the oil income it needs in the medium-term. The economic rent that it captures can be significant but may be lower and further removed than in other projects. In shallow waters, private parties can both compete and cooperate with Pemex in lower risk projects. These ventures could also offer a more relevant best practice demonstration effect close to the Pemex legacy fields. The amount of economic rent might be greater, as well as the share captured by the government. A rolling five-year bidding calendar will prove to be a useful instrument that will more precisely reveal government priorities.

## MIDSTREAM REFORM

### *No plans to privatize midstream assets*

The design of midstream reforms in the electricity, natural gas, and oil liquids sectors may make needed changes to the sector difficult. Midstream assets, along with all other existing state assets, were deemed off limits for privatization as such a move was seen as posing a serious obstacle to overall energy reform. However, under state control, the midstream has faced chronic underinvestment. A political call was made regarding privatization and the sale of assets was deemed

to pose serious obstacles to overall energy reform. Other additional decisions regarding the structuring of the midstream might also prove to be problematic. In the case of electricity, the existing transmission and distribution grids will continue to be owned by the CFE, the dominant player in power generation, or other wholly owned state-owned affiliates.

A new independent system operator (ISO) will be established.<sup>13</sup> It will be a decentralized state entity that will have operational control of the electricity system, dispatch electricity on a merit order, operate the wholesale electricity market, and guarantee open access to transmission and distribution grids. Private parties in the electricity industry will form an evaluation committee that will periodically review the performance of the ISO and the wholesale market, and publish a report. The CFE and its affiliates, the Department of Energy, or the ISO may contract third parties to upgrade and expand these grids through some form of build, lease, and transfer mechanism. However, it is the state that is responsible for the operation and growth of the transmission and distribution grids.

The Pemex natural gas transport pipelines, as well as its supply contracts, will be transferred to a state-owned ISO.<sup>14</sup> Privately held pipelines may be voluntarily integrated into the grid. Even if they only serve large consumers, they would be subject to open access discipline. In this way, expansions of the grid can be carried out privately. With respect to the transport and distribution of crude oil and oil products by pipeline, the law currently provides little guidance, stating only that permits for these activities will be required and that the Energy Regulatory Commission (CRE) will grant them. This implicitly leaves these grids under the control of the incumbent and to private road transport companies. This may be a sign that the state is having difficulties dealing with natural monopolies, and more generally with network industries. In the energy sector, where the incumbent has a predominant position, potential problems can have significant effects on private investment decisions.

### *Ongoing challenges for the midstream*

The midstream, both in electricity and in oil, has suffered from secular underinvestment. Agglomeration in key electricity nodes and corridors has been frequent and important. Transport constraints due to pipeline bottlenecks have provoked a natural gas supply crisis. Inadequate

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<sup>13</sup> Centro Nacional de Control de Energía (CENACE).

<sup>14</sup> Centro Nacional de Control de Gas Natural.

transport and storage capacity has increased the risk of supply interruptions in oil products, while raising the volume transported by trucks and tank cars. Collusion in setting tariffs by the large road transport companies has been the norm. Crude transport and storage shortages affect the quality of crudes and do not allow the flow of segregated batches. Will Pemex, CFE, their affiliates, and the new state ISOs be able to solve these problems effectively? Is the responsibility for capacity expansion clearly defined? Can the private sector be given a more active role in these matters? These are important questions that must be addressed given the history of both state companies underinvesting in the midstream.

Changes in the geographical origin and destination of energy products require more extensive and denser electricity and pipeline grids, as well as storage capacity. Demographic trends, industrial growth, a greater reliance on imports, and the creation of new markets drive the need for expansion. A large natural gas pipeline construction program is being executed. A similar effort must be launched in liquids pipelines and storage capacity, and in electricity transmission and distribution networks. These are critical decisions that will affect the liberalization of the final product markets.

## **ELECTRICITY REFORM**

### *Reducing prices to the manufacturing sector import*

Much of the attention generated from the efforts to overhaul Mexico's energy policy has focused on oil and natural gas. But many of the pre-requisites of successful reform lie in the electricity sector. The CFE must improve its operational efficiency, reduce exceptionally high power losses, and lower costs. Fundamental tariff redesign needs to eliminate subsidies and revert prevalent cross subsidization. The average price of electricity must fall to competitive levels, which is essential for the growth in manufacturing. The Mexican manufacturing sector pays much more for power than industries in many other countries – 75 percent more than in the United States, for example.

The broad market design guidelines of the proposed legislation are in place, although there are some issues that need resolution. An energy market will be created and run by the independent system operator. It will be organized as a tight pool, an arrangement by which several utilities integrate generation and transmission facilities to improve the management of power delivery. All generators have to bid their full available capacity and qualified users and retailers must submit demand bids. The market clears at the marginal bid. A salient feature of the market architecture is that generators have to bid their variable cost. This is the direct consequence of the industry

structure: the CFE owns 80 percent of total generation. According to the competition law<sup>15</sup> it has monopolistic market power and must be subject to ex-ante regulation, as the government does not intend to privatize CFE assets. A cost-based energy market is not the norm, although some Latin American countries, like Chile, Argentina and Guatemala have opted for this solution. It is expected that as gas-fired plants displace the current fuel-oil generating capacity, the market price of energy should fluctuate between the variable cost of a combined cycle during off-peak hours and that of an open cycle during peak hours.

*Potential problems exist with system*

One of the main implications of a cost-based energy market is that market revenues do not allow generators to recover their fixed costs. The proposed law acknowledges this and establishes that in order to have access to the energy market, users and retailers must buy adequate capacity to meet their maximum demand. The energy market will thus be coupled to a capacity market. However, nothing is said in the law about the structure of such a market. This is probably one of the main unresolved issues in all the energy reform measures, because investment will not take place as long as the functioning of the capacity market is not clearly defined.

Renewable energy will be supported through the obligation of qualified users and retailers to have a green share in their energy consumption. The corresponding subsidy will then be defined by the size of the share and the magnitude of a penalty. This subsidy should be significant if the government is serious about promoting wind power. Today wind power is subsidized through a preferential grid usage tariff and a generous allowance that treats as firm power capacity that is in fact intermittent.

Because of the intrinsic congestion of the Mexican grid, the law states that the energy market will be nodal, a system that allows electricity prices to be determined at specific points of a grid. However, the law unnecessarily introduces a limited definition of financial transmission rights and offers confusing rules for their allocation. On the supply side, the market power issues are solved through the cost-based definition of the energy market. However, it is not addressed on the demand side: users and retailers have a clear incentive to underbid in the day-ahead market and overbid in the real time market. It is unclear whether pure marketers will be allowed to arbitrage away differences across both markets and discipline the demand side.

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<sup>15</sup> Ley

Today over 10 percent of energy consumption is through purely bilateral private contracts, with subsidized grid usage and back-up energy and capacity. In the future, the energy market will be a tight pool. The transition between these two extreme models is complex and is not adequately handled by the proposed law, which opens simultaneously the wholesale and retail market to competition. However, it is probably unrealistic to expect significant retail competition before wholesale competition consolidates.

## **DOWNSTREAM COMPETITION**

### *Refined product competition rollout will be gradual*

Competition in final product markets will be introduced at a modest pace, with the CRE regulating prices and tariffs of basic electricity services, natural gas and oil products. Deregulation requires a competition authority<sup>16</sup> finding that confirms the prevalence of effective competition in specific product markets. In the case of tradable products, the CRE will set prices that reflect conditions in relevant international markets. Regarding non-tradable products and services the regulator will provide explicit price determination rules. For these purposes it will take into account the Treasury's opinion.

Special treatment will be given to gasoline and diesel as well as jet-fuel and LPG, in which a lengthy transition process is envisaged. Automotive fuel prices will be subject to adjustment in 2014 at set monthly increases to eliminate the gap with respect to relevant external price references. From 2015 to 2019, maximum consumer prices will be adjusted according to expected domestic inflation if international reference prices are stable or falling. If they were to increase significantly, the Treasury will review their possible adjustment. Prices will be regulated until 2020 by the CRE, under generally applied rules. Even then, the government will maintain the power to intervene, and here the law offers less guidance, at times placing the responsibility of determining prices in the Treasury and in other instances with the Executive branch.

Import controls will stay in place until the end of the current administration in 2018, and during this time only Pemex will be allowed to import gasoline and diesel. This is an important provision as imports contribute a large share of domestic supply. These shares will continue to increase in the mid-term. One other restriction will be lifted in 2017, when non-Pemex service stations will be allowed to operate.

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<sup>16</sup> Comisión Federal de Competencia Económica (CFCE).



This calendar is overly cautious and a 5-1/2 year transition appears to be too long. Treasury continues to be involved in setting prices, although it has been suggested that this responsibility would be better delegated to the CRE, as is the case with other regulated products and services. Treasury should only set and adjust sales taxes on gasoline and diesel. The regulator can put in place safeguards to manage disruptions that will necessarily arise during the liberalization process. It is paradoxical that free market supporters in government seem to be afraid of market solutions. They are not prepared to test markets pragmatically within the time frame of the current administration and unleash their creative powers.

The law is ambiguously drafted placing at times the responsibility of determining prices in the Treasury and at other instances with the Executive branch. In the first four months of 2014, 89 percent of the volume of sales would have been subject to direct control by the Treasury.

## KEY CHALLENGES MOVING FORWARD

### *Many regulations, institutions, resources needed*

The development of regulatory frameworks and institutions may also pose major challenges to reform. Midstream and downstream regulations will have to build on narrow existing foundations, as the scope of the Energy Regulatory Commission (CRE) had been limited to natural gas transport and distribution pipelines, gas regasification facilities, LPG markets and installations, and the permitting of independent power producers and self-generators. The proposed legislation widens the scope of the CRE and grants it much greater regulatory powers. Its workload will grow dramatically.

The pool of talent and experience that they will be able to tap may be limited by the growth of regulation in the upstream and in other sectors. The CRE will need significant additional funds to recruit, train, and retain staff, and to make extensive use of outside consultants. In all these efforts time will be essential. The upstream regulator, the CNH, faces even greater challenges. Until now it had few regulatory responsibilities as it was originally designed mainly to offer advice and technical support to the Department of Energy. Given the overpowering presence of Pemex and the asymmetry in technical knowledge and resources, the CNH was left with little space to grow and, to a certain extent, was captured by the state oil company.

The legislation before Congress gives much greater independence to the two regulators, which will be coordinated by the Department of Energy, although it is legally their equal. This is a

major step forward, as is the financial and administrative autonomy that they are being granted, although some potential problems could emerge. For example, the CNH's role as a regulator should seemingly exclude it from promoting private investment. This may require efforts to protect regulators from being captured by private interests. In the past, the main dangers lay in the intervention of government and powerful state-owned companies. It was always an uncomfortable situation when a government agency, embedded in the Department of Energy, had to regulate other government entities. Now they will also have to deal with powerful private interests.

*Potential issues for safety, environmental regulations*

Two structural problems regarding safety and environmental regulation may also loom on the horizon. The decision to segregate safety and environmental regulation from the two existing regulatory agencies follows experience in other countries. However, the National Industrial Safety and Environmental Protection Agency for the Energy Sector has been attached to the Environmental and Natural Resource Department<sup>17</sup> instead of structuring it as an independent regulatory commission. Given the highly specialized nature of some of its activities, the high costs involved in regulation, and its role in dealing with potentially catastrophic events and accidents that can arise in the energy sector, it has been suggested that it would have been more beneficial in the long run to attach the new agency to the Department of Energy and give it the same legal status and structure as that of the other two regulators. Unfortunately, this decision was included in the Constitutional amendment so that its modification would require a new amendment.<sup>18</sup> Overall, this section of the draft legislation is less clear than other areas. More work and input from industry specialists should ultimately clarify some outstanding questions.

The CNH will have to deal with very demanding tasks in the short-run. There are very few people in Mexico that combine technical skills, economic expertise, and regulatory experience. This specific set of competencies cannot be improvised and their development takes years, not months. Given the Pemex technical monopoly and its problems in the development of petro-technical personnel, recruitment will be difficult. The CNH will also have to guard itself against overdependence on retired engineers and geoscientists whose fundamental loyalty is to Pemex. In any case, the more competent will tend to migrate to private industry. Up until now, the CNH was

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<sup>17</sup> Agencia Nacional de Seguridad Industrial y Protección al Medio Ambiente del Sector Energético and Secretaría de Medio Ambiente y Recursos Naturales (Semarnat).

<sup>18</sup> Transitional article 9.

given very limited resources. It will now have to rely extensively on outside consultants, given its own staffing problems. The Commission will need adequate funding for all of this and for developing the infrastructure needed for managing a great volume of data.

## CONCLUSION

*There are still many important issues that must be addressed to make reforms a success*

The first steps of a fundamental change program for the Mexican energy sector have been taken. They are of critical importance. Once Congress approves the energy legislation package, the piecemeal construction of the new regulatory framework will begin. The regulatory authorities will formulate a body of guidelines, directives, resolutions and norms that will further structure the energy sector.

An appropriate balance between laws and regulations is required as reliance on regulation provides much needed flexibility to adjust to changing and unforeseen circumstances. However, regulations must have a solid legal foundation that makes them enforceable.

All of this initial work is only the beginning of a long journey that needs well-designed strategies and, more importantly, excellence in their execution. Energy reform will face concrete and tangible challenges and obstacles that must be dealt with pragmatically. The speed of the process thus far has been notable, but the laws and rules must stand up over the long term, and be bolstered by deep, democratic discussions that ensure wide support.

Strong and able leadership will be needed to mobilize the necessary resources and to inspire the teams that will carry out this ambitious program, in which change must become self-sustaining. Underlying this process is a clear definition of success, both in terms of high-level objectives, such as strengthening the Mexican manufacturing sector; increasing oil production; and boosting GDP growth; and specific goals such as the creation of new regulatory agencies, processes, and contracts. Measuring progress toward their achievement is an essential task.

Many important details must still be addressed, especially in areas such as the downstream, midstream, and electricity sectors, which have received less attention than the oil upstream. While oil production must be increased, bottlenecks in the midstream must be removed to eliminate the risk disruptions of natural gas and fuel to end-users. Under current economic conditions, the energy sector must not restrict the growth of Mexico's manufacturing industry, where high productivity employment is found and where productivity often grows at greater rates. But energy can further

contribute to the growth of industry by strengthening and deepening its supply chain, so as to reinforce the competitiveness of manufacturing exports.



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