Energy Reform in Mexico: An Update

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Chairman

November 11, 2018
From March 20th to March 23rd, 2018, the VII World Forum on Energy Regulation (WFER) took place in Cancun, Mexico

This edition’s main topic was: “Regulating in a Time of Innovation: Empowered Consumers, Dynamic Markets and Sustainable Infrastructure”

Some highlights of the VII WFER are:

- The most attended WFER ever, with more than 1,200 participants
- 80 countries represented
- Key Lectures by Michael Liebreich and Bertrand Piccard
- New activities: Regulatory Training Day, High Level Commissioner Round Tables, and Women in Energy Panel

Percentage of men and women who participated:
- 65% men
- 35% women

VIII WFER will take place in Lima, Peru in 2021
The reform of Mexico’s energy industry in 2013-2014, triggered a significant portfolio of energy projects nationwide.

**Estimated Investment:** 318 billion dollars

**Committed Investment:** 188 billion dollars

### Power Sector

1st Power Auction: 2.6 billion USD  
2nd Power Auction: 4 billion USD  
3rd Power Auction: 2.4 billion USD

Distributed Generation: 700 million USD

### Natural Gas, LPG and Petroleum Products

**Natural Gas:** 22.6 billion USD  
- Transportation and distribution by pipeline: 12.2 billion USD  
- Retailing: 37.2 million USD  
- Other activities: 10.4 billion USD

**LPG:** 428.9 million USD  
- Transportation: 93.3 million USD  
- Storage and Distribution: 298.3 million USD  
- Retailing: 37.3 million USD

**Petroleum Products:** 20.1 billion USD  
- Transportation: 4.2 billion USD  
- Storage and Distribution: 3.9 billion USD  
- Retailing: 12.0 billion USD

### Hydrocarbons:

“Rounds One, Two, and Three”

**Round 1:**
- 1st Tender: 2.7 billion USD  
- 2nd Tender: 3.1 billion USD  
- 3rd Tender: 1.1 billion USD  
- 4th Tender: 34.4 billion USD

**Round 2:**
- 1st Tender: 8.2 billion USD  
- 2nd Tender: 1.1 billion USD  
- 3rd Tender: 1.0 billion USD  
- 4th Tender: 93 billion USD

**Round 3:**
- 1st Tender: 8.6 billion USD

**Farmouts:**
- Trión: 11 billion USD  
- Cárdenas-Mora: 127 million USD  
- Ogarrio: 95 million USD  

**Seismic data:** 2.0 billion USD

A total of 135 companies from 19 countries, of which 51 are Mexican, are currently developing hydrocarbon and electricity projects in Mexico.

1/ Total expected investment by the National Electric System Development Program (PRODESEN, for its acronym in Spanish) 2018-2032, Mexico’s Ministry of Energy
Mexico’s Gas Pipeline Network

11,347 kilometers (km) / 7,051 miles (mi)

National Pipeline Network (SNG, for its acronym in Spanish) as of 2012

4,639 km / 2,882 mi

Additional capacity since the expansion of the SNG

Since 2012, the pipeline network has increased in 41%

7,586 km / 4,714 mi

Committed pipelines since 2012

Towards 2020, the pipeline network will have grown by 67% compared to 2012

South Texas-Tuxpan underwater pipeline:
- Capacity: 2.6 Bcf/d
- Start of operation: First quarter of 2019

Reconfiguration of the Cempoala Compression Station:
- Improvements: north-south flow 0.35 Bcf/d
- Start of operation: First quarter of 2019

Jaf Storage Site:
- Location: 5.8 kilometers (3.6 miles) from SISTRANGAS
- Storage capacity: 10 Bcf

In operation (SNG)
In operation (SNG expansion)
In construction
In evaluation
Pipelines with social conflicts
Cempoala Compression Station
Jaf Storage Site

1/ Billion cubic feet day
2/ Third Annual Revision of the Five Yearly Plan for Expansion of Mexico’s National Natural Gas Transportation and Storage System 2015-2019
3/ Mexico's National Natural Gas Transportation and Storage System
Considering the legacy capacity allocated to Pemex and CFE, the first Open Season, and the recognition of previously existing contracts, 97% of the available capacity on Mexico’s National Natural Gas Transportation and Storage System (SISTRANGAS)\(^1\) has been allocated on a firm basis.

\[\text{SISTRANGAS reserved capacity} = 6.2 \text{ Bcf/d}\]

- **Independent power producers** (29%)
- **PEMEX (self-consumption)** (26%)
- **CFE** (11%)
- **Pemex as a trader** (19%)
- **Other (traders and end-users)** (15%)

\(\checkmark\) Up to 44% of the reserved capacity was allocated to agents different of PEMEX (traders, independent power producers and other end-users). This will facilitate the participation of new actors in the natural gas market.

By the end of Phase 1 of the Natural Gas Contract Release Program, **Pemex had released 39.4%\(^2\) of its total trading volume** associated to its client portfolio.

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1/ SISTRANGAS, for its acronym in Spanish
2/ The figure is subject to further clarifications requested to Pemex by CRE
79% of Mexican households use Liquefied Petroleum Gas (LPG) as the main fuel for cooking and water heating, followed by firewood with 11% of households.

<table>
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<tr>
<th>Fuel</th>
<th>% of total</th>
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<td>LPG</td>
<td>79%</td>
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<td>Firewood</td>
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<td>Natural Gas</td>
<td>7%</td>
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<td>Electricity</td>
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<tr>
<td>Others$^3$</td>
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To encourage the substitution of firewood with LPG:

- In July 2017, the “Program for the adequate coverage of LPG and firewood substitution”$^2$ began. In it, CRE, the Ministry of Energy (SENER, for its acronym in Spanish), and the Ministry of Social Development (SEDESOL, for its acronym in Spanish) will participate.
- CRE promotes the diversification of supply through the figure of cellars (As of today, 203 cellars have been set up).
- In coordination with distributors and Federal Government entities, 15 thousand kits (grills and cylinders) have been donated to homes that used firewood as fuel.

### Social Lagging Indicators

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<tr>
<th>Share of Households</th>
<th>Social Lagging Indicators</th>
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<tbody>
<tr>
<td>0.49%</td>
<td>Unavailability of power</td>
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<tr>
<td>3.07%</td>
<td>Earthen floor</td>
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<td>7.09%</td>
<td>Unavailability of tap water from the public grid</td>
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<td>4.98%</td>
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<td>11.00%</td>
<td>Firewood Use</td>
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</table>

$^1$ National Institute of Statistics and Geography (INEGI, for its acronym in Spanish). First National Survey on Energy Consumption in Households (ENCEVI, for its acronym in Spanish)

$^2$ The program will reach the states of Tlaxcala, Jalisco, Yucatán and Guanajuato

$^3$ Does not use fuel or does not cook
There are opportunity areas in the logistics considered for the calculation of LPG costs under market conditions.
CRE has focused in introducing competition measures in the LPG industry. Ever since the price liberalization, distribution margins have reacted to market signals.

- **January 1, 2017**: Liberalization, by law, of the LPG price at a national level.
- **March 2, 2017**: Approval of the first permit for a participant to enter a region where it had no previous operation.
- **April 11, 2017**: Start of operations of the first participant entering a region where he had no previous operation.
- **April 2017**: Publication of the prices by municipality at CRE's website.

**Timeline**:
- **February 22, 2018**: Complaint filed by CRE before the Federal Commission of Economic Competition (COFECE, for its acronym in Spanish) for potentially anti-competitive behavior (first complaint in the history of the sector).
- **April 11, 2017**: Start of operations of the first participant entering a region where it had no previous operation.
- **March 2, 2017**: Approval of the first permit for a participant to enter a region where it had no previous operation.
- **April 2017**: Publication of the prices by municipality at CRE's website.
- **May 15, 2018**: First fine charged to a private company, for an amount of 539 thousand dollars, for denying another competitor the interconnection of transport by pipeline.
- **March 2, 2017**: Approval of the first permit for a participant to enter a region where it had no previous operation.
- **April 11, 2017**: Start of operations of the first participant entering a region where he had no previous operation.
- **April 2017**: Publication of the prices by municipality at CRE's website.

**Graph**:
- **Average Net Margin**: Distribution Net Margin is shown over time.
- **Minimum Net Margin**: Distribution Net Margin is shown with a lower bound.
- **Maximum Net Margin**: Distribution Net Margin is shown with an upper bound.

**Legend**:
- **$0.17**
- **$0.24**
- **$0.26**

1/ Distribution net margin = Consumer prices - First-hand sales price - Logistics (0.02 dollars/kilogram). Prices until November 5, 2018.
Logistical routes for the import and supply of petroleum products in Mexico

Cost for transporting one barrel of gasoline:

- Pipeline
- Vessel (2 times pipeline cost)
- Train (6 times pipeline cost)
- Truck (14 times pipeline cost)
CRE grants permits for the transportation of petroleum products by pipeline and other means such as railways.

**Ferromex.**

**Ferrocarril Mexicanos, S.A. de C.V.**
- Permit: PL/12953/TRA/OM/2015
- Destination: Guadalajara, Jalisco; Chihuahua, Chihuahua; Piedras Negras, Coahuila de Zaragoza; Nogales, Sonora; Mexicali, Baja California; and Manzanillo, Colima.

**Baja California Railroad, S.A de C.V.**
- Permit: PL/20174/TRA/OM/2017
- Destination: Tecate, and Tijuana, Baja California.

**Kansas City Southern de México, S.A. de C.V.**
- Permit: PL/12952/TRA/OM/2015
- Destination: Puebla, Puebla; Mexico City; Cadereyta Jiménez, Nuevo León; Tampico and Ciudad Madero, Tamaulipas; Lázaro Cárdenas, Michoacán; Durango, Durango; Minatitlán and Coatzacoalcos, Veracruz; Salina Cruz, Oaxaca; Ciudad Valles, San Luis Potosí, Tula de Allende, Hidalgo, as well as Salamanca and Irapuato, Guanajuato.

**LINEA COAHUILA DURANGO, S.A. DE C.V.**
- Permit: PL/13373/TRA/OM/2016
- Destination: Durango, Durango.

**Invex Infraestructura 4, S. A. P. I. de C. V.**
- Permit: PL/21495/TRA/DUC/2018
- Destination: Tuxpan, Veracruz and Tula, Hidalgo.

**Ferrocarril del Istmo de Tehuantepec, S.A. de C.V.**
- Permit: PL/13551/TRA/OM/2016
- Destination: Valladolid and Mérida, Yucatán.

**Ferrosur, S.A. DE C.V.**
- Permit: PL/12954/TRA/OM/2015
- Destination: Veracruz and Coatzacoalcos, Veracruz.

**Línea Coahuila Durango, S.A. de C.V.**
Storage and distribution projects of gasoline and diesel\(^1\)

<table>
<thead>
<tr>
<th>State</th>
<th>Projects in evaluation of CRE</th>
<th>Granted storage permits</th>
<th>Announced projects</th>
<th>Announced projects in ports</th>
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**Total** 36 6 18 3

\(^1\) Corresponds to project information with granted permissions, and in evaluation with the Commission, to November 3\(^{rd}\), 2018.

Information of the announced projects corresponds to media and web pages of the operating firms.
There are new traders that import gasoline and diesel. This strengthens the security of fuel supply in Mexico\(^1\)

**Announcement of competitors**

- BP contracted 50% of the capacity of the IEnova storage terminal in Ensenada, Baja California
- Chevron contracted 50% of the capacity of the IEnova storage terminal in Topolobampo, Sinaloa

**Carvel, through Windstar Energy Resources, imports fuel from Houston, Texas to Aldama, Chihuahua**

**Black Gold, through Windstar Energy Resources, imports fuel from Houston, Texas to Chihuahua, Chihuahua**

**Andeavor (Tesoro) imports fuel by vessel to Rosarito, Baja California and by truck to Tijuana, Baja California**

**ExxonMobil imports fuel by vessel and by rail from Texas to San Luis Potosi, Guanajuato, Hidalgo, and Nuevo Leon**

**Koch Mexico, through Vopak Mexico’s terminal, imports 40 thousand barrels of diesel per day to the Port of Veracruz, Veracruz by vessel**

**Glencore imports fuel by vessel to Dos Bocas, Tabasco, to supply G500 gas stations**

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1/ With information of the Tributary Administration Service (SAT, for its acronym in Spanish)
There are 12,138 gas stations operating in Mexico. CRE has identified 3,271 (27% of total) that operate under 54 new brands (35 are Mexican)\(^1\)

Of the 18 brands that offer differentiated product by additivation, 5 do not use Pemex’s base product\(^2\)

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1/ The Ministry of Energy (SENER, for its acronym in Spanish) that has been obtained from a market study based on information in the media and internet pages pertaining to gasoline and diesel dispensers, as well as information provided by CRE. Information as of November 9, 2018.

2/ The 5 brands with totally different product are: GSXO; ExxonMobil; Arco; Black Gold; Carvel.
The Mexican law establishes clean power generation targets

The above mentioned remarks, will depend on 4 factors:

1. The consolidation of the Wholesale Electricity Market
2. The development of transmission and distribution infrastructure
3. The deployment of distributed generation
4. Social engagement of the infrastructure projects

By 2024, 38% of the energy dispatch is expected to come from clean energies

Mexico occupies the 4th position of 71 economies with greater attractiveness for investments in clean energy

The first, second and third Long Term Auction will contribute to Mexico’s clean power generation by 1.9%, 3% and 1.8% starting in 2018, 2019, and 2020 respectively

1/ “Clean energy technologies” are understood in the Mexican law as: nuclear, hydropower, bioenergy, geothermal, efficient cogeneration, wind and solar installations. (Electricity Industry Law)
2/ Estimated by Mexico's National Energy Control Center (CENACE for its acronym in Spanish)
Currently, more than 200 clean electricity plants operate in 28 states of Mexico, which represent an installed capacity of 20 GigaWatts (26% of the total installed capacity in Mexico)\(^1\)

<table>
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\(^1\) "Clean energy technologies" are understood in the Mexican law as: nuclear, hydropower, bioenergy, geothermal, efficient cogeneration, wind and solar installations. (Electricity Industry Law)

\(^2\) Installed Capacity: 78.4 thousand MW. CRE’s information as of August 20, 2018
As a result of the three Long Term Auctions of the Electricity Market, 70 new electricity plants will be developed in 19 states in Mexico.

9 billion dollars of investment in the upcoming years

**Average auction prices**

<table>
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<th>Energy Type</th>
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<tr>
<td>Wind</td>
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<td>18.48</td>
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**Winners**

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1/ Weighted average of offers of packages that only offered Energy and CELs. Exchange rate (MX / USD) used by LTA: 1st 17.3192, 2nd 20.17, 3rd 19.185
On March 15, 2018, the fourth Long Term Auction was announced. In this regard, CRE will grant continuity to the positive results shown in the previous auctions.

**Fourth Auction Characteristics:**

- **It will be possible to buy 3 products:**
  - Clean Energy Certificates (CELs), Energy, and Capacity

- **The clearinghouse mechanism will continue**

- **Buyers different from CFE will be able to participate in the process**

**CFE SSB and Load Serving Entities (LSEs) purchasing offers**

**CELs**
- 5.9 million with a maximum price of **18.87 dls/CEL**

**Energy**
- 5.9 MWh with a maximum price of **38.58 dls/MWh**

**Capacity**
- 132 MW-year on average for the three zones with an average maximum price of **69,873 dls/MW-year**

66% corresponds to the offer of CFE SB and 34% to the LSE.

**December 18th (deadline)**

Ruling of the fourth Long Term Auction

34 generating companies with 396 selling offers are pre-qualified.

It is estimated that the fourth Auction will **increase Mexico’s current generation capacity** by around 5% (additional 3.8 GW).

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1/ LSEs are: Iberdrola Clientes, Servicios de Energía México Syem S. A. P. I de C. V., Menkent S. de R. L. de C. V., FSE Suministradora Fénix S. A. P. I. de C. V. y Tuto Energy Trading S. A. P. I. de C. V.

2/ National Interconnected System (SIN), Baja California Sur Electric System (BCS) and Baja California Interconnected System (BCA)
Towards 2021, around 200 renewable electricity plants\(^1\) will be developed in 30 states of Mexico. This will represent an increase of 19.5 GigaWatts in installed capacity.

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<tr>
<th>State</th>
<th>Solar</th>
<th>Wind</th>
<th>Geothermal</th>
<th>Hydropower</th>
<th>Biomass</th>
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<td><strong>Total</strong></td>
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<td><strong>3</strong></td>
<td><strong>11</strong></td>
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**SYMBOLOLOGY:**

- Solar
- Wind
- Geothermal
- Hydropower
- Biomass

By the summer of 2019, 84 new power plants will go into operation, this will add 12,429 MW to the National Interconnected System (SIN, for its acronym in Spanish); 51% of this capacity is based on clean technologies\(^2\)

1/ “Clean energy technologies” are understood in the Mexican law as: nuclear, hydropower, bioenergy, geothermal, efficient cogeneration, wind and solar installations. (Electricity Industry Law). Electric generation permits granted by CRE starting from 2014 for energy plants that will start operating before 2021

2/ Estimation of Mexico’s National Energy Control Center (CENACE for its acronym in Spanish)
In addition to large-scale generation projects, there has been significant growth in distributed generation in Mexico. It is expected that this trend will continue in the upcoming years.

The installed capacity of distributed generation was 455 MW, which represented 0.6% of the total installed capacity.\(^1\)

Since 2012, solar installations have nearly doubled every year.

In the next 6 years, it is estimated that 5 million solar roofs will be installed in Mexico.\(^2\)

The “IT Platform in Distributed Generation” is a tool of CFE that allows the users to manage through the internet the elaboration, reception, monitoring, attention and issuance of approval of interconnection requests.

### Contracts by sector

- Residential: 20%
- Commercial: 74%
- Small-scale Industrial (5%)
- Others (<1%)

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\(^1\) The figure is shown at the National Electric System Development Program (PRODESEN, for its acronym in Spanish).


\(^3\) Estimated data for the first semester of 2018, based on information presented by CFE’s distribution subsidiary as of December 31, 2017. Own elaboration.
Energy Reform in Mexico: An Update

Guillermo I. García Alcocer
Chairman

November 11, 2018
What is the Energy Regulatory Commission?

- CRE is a **coordinated regulatory body on energy matters**, which promotes the efficient development of the energy sector and the reliability of hydrocarbons and electricity supply.

- CRE **has its own legal personality, technical and managerial autonomy** as well as **budgetary self-sufficiency**

**CRE’s Governing Board** is composed by 7 **Commissioners**, including its President.

- For the designation of each Commissioner, the President of Mexico submits to the Senate a list with three recommendations for its consideration.

- The Senate appoints each Commissioner by a **two-thirds majority** vote cast.

- Commissioners are designated by **staggered periods of seven years**, with the possibility of being re-designated, for a single occasion, to another period.
Mission

“To guarantee the conditions to assure that the availability of energetic resources in Mexico is the required, with quality and competitive prices”

Vision

“To be a transparent, efficient and highly-qualified organism, whose autonomous decisions establish an efficient, participative and reliable regulatory environment for the energy sector in Mexico”
Mexico's Energy Regulatory Commission (CRE) issues technical and economic regulation; grants and manages permits; monitors, verifies and in the given occasion, sanctions the participants of the entire electricity value chain as well as the downstream hydrocarbons sector.
CRE has rules of operation, contact and transparency, which have allowed it to promote an honest and institutional integrity agenda

- **Open-door policy.** Anyone can request online a meeting with the technical staff and Commissioners (first in time, first in right)

- **Hearings** with permit holders are recorded. All Commissioners are called and, at least, two must be present.

- The ** Governing Council’s sessions** are broadcasted live. All permits and resolutions are public and are available on the CRE website.

- The **Commissioners have the obligation to inform** in advance of their activities outside CRE (i.e. commissions, forums, congresses, etc.)

- **100% of our procedures are carried out online** through the Clerk’s Office

- **Online tutorials and on-site workshops** are offered. CRE has also a telephone assistance line (with a 91% satisfaction level) to explain permit request and issuing procedures

- **Since 2016, CRE implements an institutional austerity policy**
For CRE, it is essential to include gender perspective in energy regulation decisions, which is why it has increased the number of women in positions of managerial responsibility.

According to the "Study on equality between women and men in matters of jobs and wages in the Federal Public Administration", conducted by Mexico's National Human Rights Commission (CNDH, for its acronym in Spanish), women occupy less than 20% of the positions at the Head of Division level.¹

According to the study "Untapped Reserves" developed by the Boston Consulting Group in collaboration with the World Petroleum Council, only 22% of the employees in the hydrocarbon sector are women.²

On August 16, CRE issued gender balance guidelines for the participation of its personnel in events. The guidelines of the Organization for Economic Co-operation and Development (OECD) on gender equality were taken as reference and CRE adopted them as its own in the activities of its scope.

³/ Data as of July 15, 2018