MEXICO’S ENERGY REFORM

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November 21, 2017
PROMULGACIÓN DE LA REFORMA ENERGÉTICA

Ciudad de México, 20 de diciembre de 2013.
In 2012, Mexico’s energy sector was showing serious signs of strain, despite Energy reform of 2008 and growing investment:

- **Declining** oil and gas production.
- Increasing **power production costs**.
- Stagnant **investment** in **renewables**.
- **Ageing infrastructure** and limited investment.
- Limited **technological development**.
- **Widening human resources gap**.
- Increasing **dependency on natural gas and oil products imports**.

### Mexico 2012: Urgent Need for an Energy Reform

<table>
<thead>
<tr>
<th>Year</th>
<th>Oil Production (MMbd)</th>
<th>Investment in O&amp;G exploration and production (Billion USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>3.0</td>
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</tr>
<tr>
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<td>2010</td>
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<td>2014</td>
<td>2.3</td>
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<tr>
<td>2015+</td>
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<tr>
<td>2016</td>
<td>2.3</td>
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<tr>
<td>2017</td>
<td>2.3</td>
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<tr>
<td>2018</td>
<td>2.3</td>
<td>2.3</td>
</tr>
<tr>
<td>2019</td>
<td>2.3</td>
<td>2.3</td>
</tr>
<tr>
<td>2020</td>
<td>2.3</td>
<td>2.3</td>
</tr>
</tbody>
</table>

• Average rates: 25% higher than in the US
• Without subsidies: difference would be 73%
• Subsidies equal to 0.75% of GDP

Sources: Sistema de Información Energética (Mexico), Energy Information Administration (USA)
GOALS OF THE REFORM

• Energy Security
• Promote clean energies
• Attract investment and state of the art technology
• Optimize the use of oil revenues
• Boost economic growth, job creation and competitiveness of Mexican economy
MEXICO’S new ENERGY MODEL

**State Owned Monopoly**

- **Hydrocarbons belong to the Nation**
- **Rule of Law**
- **Stronger Institutions**
- **Sustainability**
- **Transparency**

**Open and Competitive Markets**
NEW LEGAL FRAMEWORK AND INSTITUTIONAL ARRANGEMENT

3 Articles of the Constitution
22 Laws
25 Regulations
4 New Institutions
2 Regulators Strengthened
2 State Productive Enterprises

Articles:
25, 27 y 28
10 new
12 amended

ISO

CENAGAS

CNH

PEMEX

CFE

CENACE

CRE

ASEA

FMP

INDUSTRIAL SAFETY AND ENVIRONMENTAL PROTECTION
OIL REVENUES ADMINISTRATION
PEMEX can partner up with other companies to access capital and technology through associations that require a bidding process conducted by the State.
Mexico’s new upstream contracting model is designed to:

- Attract **investment**
- Facilitate access to **state of the art technology**
- **Balance risks** as we move into frontier fields
- Awarded through bidding process

**Concessions are banned by the Mexican Constitution.**
ROUND ONE
FIRST APPROACH, ANNOUNCED AUGUST 13, 2014
1st Bid: Exploration in Shallow Waters
- Production Sharing Contract
- 2 contracts awarded on July 15, 2015
- First oil: 2019
- Peak production: 79 Mboed
- Estimated Investment: 2.7 billion USD

2nd Bid: Extraction in Shallow Waters
- Production Sharing Contract
- 3 contracts awarded on Sept. 30, 2015
- First oil: 2018
- Peak production: 124 Mboed
- Estimated Investment: 3.1 billion USD

3rd Bid: Extraction in Onshore Fields
- License Contract
- 25 contracts awarded on Dec. 15, 2015
- First oil: 2016-2017
- Peak production: 77 Mboed
- Estimated Investment: 1.1 billion USD

Mboed: thousand barrels of oil equivalent per day.
Exploration in Deep Waters

- License Contract
- 10 exploration areas
- Depth range: 500 - 3,600 meters
- Resources: super light, light and heavy oil, gas and wet gas
- Exploration phase: 4 - 10 years.

31 INTERESTED COMPANIES
26 PREQUALIFIED PARTICIPANTS
4.4 BILLION USD PER CONTRACTUAL AREA
**PEMEX E&P Projects**  
**TRION: First Farm Out**

*PEMEX can partner up with other companies through farm-outs to access the capital and technologies required to develop advanced projects.*

- Trion tender date Dec 5, 2016.
- 10 Registered companies.
- JOA includes some non-negotiable terms in accordance to Hydrocarbons Law (Art. 29).
- Partners will be selected through **bidding processes**.
- Other farm-outs are in process
ROUND TWO
BEGAN JULY 2016

1st Bid: Exploration and Extraction in Shallow Waters
- Production Sharing Contract
- 15 contracts
- Awarding: March 2017

2nd Bid: On-Shore Exploration and Extraction
- License Contract
- 12 contracts
- Awarding: July 2017

3rd Bid: On-Shore Exploration and Extraction (small fields)
- License Contract
- 14 Contracts
- Awarding: July 2017
INCREASING THE AVAILABILITY OF GEOLOGIC INFORMATION

- Creation of the National Center of Hydrocarbons Information (CNIH)
- Registry of authorized surface exploration companies

43 AUTHORIZED RECOGNITION AND SURFACE EXPLORATION PROJECTS

2.4 TIMES THE AVAILABLE 3D WAZ SEISMIC DATA

2 BILLION USD

* Authorizations for Recognition and Surface Exploration granted by CNH.
The Mexican Petroleum Fund is designed to optimize the use of Mexico’s oil revenue following unprecedented transparency and accountability standards, contributing to the stabilization of Mexico’s public finances, and fostering industrial and human development in the medium and long term.

When saving exceed 3% of GDP, up to 60% of the surplus will be spent in:

- **Long term savings**
- **Federal Budget (4.7% GDP)**
- **Oil Revenue**

- **Universal Pension Fund** (10%)
- **Research and Development** (10%)
- **O&G projects and Infrastructure** (30%)
- **Scholarships, Connectivity Projects, Regional Development** (10%)

• First transfers from Pemex: January 2015.
• First payments derived from Round One: October 2015.

Financial information related to the Mexican Petroleum Fund is available at: www.fmped.org.mx
NATURAL GAS

CENAGAS
INDEPENDENT SYSTEM OPERATOR

LIBERALIZATION OF NG MARKETS

NEW PRICE REFERENCES
According to the **Gas Pipelines Five Year Plan*** Mexico will have the following infrastructure by 2019:

- 10 New strategic gas pipelines
- 2 Social coverage pipelines
- 5 new interconnections with the USA
- **9 Bcf import capacity** (currently at 5 Bcf)

**Estimated Investment:**

*16 billion USD*

** Excluded from the Five Year Plan

**Merchant pipelines can be developed through permits at investors own cost and risk.**
Increasing demand for fuels

Liberalization of imports

Open access to infrastructure
The variety of **North American crudes** (light and sweet vs. heavy and sour) allows for the optimization of **existing regional refining infrastructure** to fulfill the current and growing demand for fuels and other oil derived products.

**Mexico imports:**
- Petrochemicals 75%
- Gasolines 53%
- Diesel 38%
- Jetfuel 34%
- LPG 36%
- Natural gas 40%

**Mid & Downstream:**
**Investment Opportunities in Infrastructure**

**Storage baseline:**
- 77 Storage and Distribution Terminals
- 5 Maritime Operation Terminals
- Nominal capacity: 30.5 Million barrels
- Useful capacity: 23.7 Million barrels
Market Liberalization: Gasoline and Diesel

Maximum and minimum price policy, considering the evolution of international prices and an inflation.*

Imports: Pemex

Gradual liberalization, Prices based on market conditions in areas defined by CRE and COFECE.

Retail: Pemex and other brands 2016 onwards

Free Imports*** April 2016

** Originally set in Hydrocarbons Law for 2018.
*** Originally set for 2017
Market Liberalization: LPG

Maximum prices scheme open to adjustments based on international prices development. Prices defined by the market.

Imports: Pemex

Interested parties can import LPG according to the applicable law dispositions.

The implementation of a focalized support program aimed at low income sectors.
MEXICO’S WHOLESALE POWER MARKET

Generation
- CFE Subsidiary “A”
- CFE Subsidiary “B”
- CFE Subsidiary “C”
- Private Parties

System Control and Power Market
- Short Term Transactions
- Long Term Contracts

Retail
- Spot Market
- Auctions

Consumption
- Unregulated Supply
- Qualified Users
- Basic Service Users
- Regulated Supply

Transmission
- Distribution

PRIVATE PARTIES
REGULATED SUPPLY
UNREGULATED SUPPLY
QUALIFIED USERS
BASIC SERVICE USERS
REGULATED SUPPLY
MEXICO’S WHOLESALE POWER MARKET
Transmission and Distribution remain reserved to the State, but Associations and Contracts are permitted in order to finance, install, maintain, administer, operate and expand networks. (Constitution)

- SENER can determine that non-CFE lines be contracted.
- The first tender for a non-CFE transmission line was launched last in October 2016.

<table>
<thead>
<tr>
<th>Contract Type</th>
<th>Public Service</th>
<th>New Investment</th>
<th>Commercial Risk (Who assumes)</th>
<th>Operation and Maintenance</th>
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</thead>
<tbody>
<tr>
<td>Privatization</td>
<td></td>
<td></td>
<td>- Prohibited by Constitution -</td>
<td></td>
</tr>
<tr>
<td>Concession</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integral Management</td>
<td>Public</td>
<td>Private</td>
<td>Private</td>
<td>Private</td>
</tr>
<tr>
<td>Risk Sharing</td>
<td>Public</td>
<td>Private or Mix</td>
<td>Shared</td>
<td>Private with public supervision</td>
</tr>
<tr>
<td>Operation and Maintenance</td>
<td>Public</td>
<td>Public</td>
<td>Public</td>
<td>Private with public supervision</td>
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<tr>
<td>Public Management</td>
<td>Public</td>
<td>Public</td>
<td>Public</td>
<td>Public</td>
</tr>
</tbody>
</table>
Clean Energy Goals:
35% in 2024, 40% in 2035 and 50% in 2050

### Renewable Energy Potential

<table>
<thead>
<tr>
<th></th>
<th>Installed Capacity 2° semester 2014 (MW)</th>
<th>Actual Generation Year 2013 (% of total GWh)</th>
<th>Actual Generation + Proven Resources +Probable Resource</th>
<th>Actual Generation + Proven Resources +Probable Resource +Possible Resource</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind</td>
<td>1,900</td>
<td>1.4%</td>
<td>5.3%</td>
<td>5.3%</td>
</tr>
<tr>
<td>Geothermal</td>
<td>823</td>
<td>2.0%</td>
<td>2.2%</td>
<td>22.5%</td>
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<tr>
<td>Solar</td>
<td>64</td>
<td>0.01%</td>
<td>0.6%</td>
<td>0.6%</td>
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<tr>
<td>Mini Hydro</td>
<td>419</td>
<td>0.5%</td>
<td>1.7%</td>
<td>9.5%</td>
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<tr>
<td>Total</td>
<td>3,206</td>
<td>4.0%</td>
<td>9.9%</td>
<td>37.9%</td>
</tr>
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</table>

Solar Resources

Wind Resources

Geothermal Resources
ASSIGNMENT OF CFE PLANTS AND PPA’S TO SIX COMPANIES

Legend

<table>
<thead>
<tr>
<th>Type</th>
<th>Size</th>
<th>Company</th>
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</thead>
<tbody>
<tr>
<td>Thermal</td>
<td>&lt; 100 MW</td>
<td>EPS I</td>
</tr>
<tr>
<td>Hydro</td>
<td>&gt;=100 MW &amp; &lt; 500 MW</td>
<td>EPS II</td>
</tr>
<tr>
<td>Wind</td>
<td>&gt;=500 MW &amp; &lt; 2,000 MW</td>
<td>EPS III</td>
</tr>
<tr>
<td>Solar</td>
<td>&gt;=2,000 MW</td>
<td>EPS IV</td>
</tr>
<tr>
<td>Geo.</td>
<td>&gt; 2,000 MW</td>
<td>EPS V</td>
</tr>
<tr>
<td>Various</td>
<td></td>
<td>Corp. VI</td>
</tr>
</tbody>
</table>

EPS I
EPS II
EPS III
EPS IV
EPS V
EPS VI
Corp.

New Plants
Existents
## Market Features

<table>
<thead>
<tr>
<th>Market</th>
<th>Periodicity</th>
<th>Market Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy and Ancillary Services</td>
<td>Daily, Hourly</td>
<td>Cost Based</td>
</tr>
<tr>
<td>Capacity</td>
<td>Yearly</td>
<td>Administered</td>
</tr>
<tr>
<td>Clean Energy Certificates</td>
<td>Yearly</td>
<td>Unrestricted offers</td>
</tr>
<tr>
<td>Financial Transmission Rights</td>
<td>Yearly / Monthly</td>
<td>Unrestricted offers</td>
</tr>
</tbody>
</table>

### Auctions and Long Term Contracts

- CRE will set requirements for retailers to contract forward energy and associated products.
- Basic Service Retailers may only contract forward through auctions operated by CENACE.
**Day Ahead Market Results**

Local Marginal Price
Average Hourly from January 29th to September 23rd, 2016.

- The average includes 2,130 nodes in this system.
MARKET PARTICIPATION TO DATE

- **Generator**
- **Intermediation Generator**
- **Basic Supply**
- **Qualified Supply**

- **American Light & Power MX**
- **Granja Generadora de Energía Solar, A.C.**
- **Compañía Cervecería de Coahuila, S. de R.L. de C.V.**

- **Rosch Latam México, S.A. de C.V.**
- **Energía Renovable del Istmo II, S.A. de C.V.**
- **Iberdrola Generación S.A. de C.V.**
- **Iberdrola Clientes S.A. de C.V.**

- **Generadora Fénix, S.A. P.I. de C.V.**
- **Frontera México Generación, S.A. de R.L. de C.V.**
- **Energía Buenavista, S.A. de R.L. de C.V.**

- **Suministro Sustentable de Energía en México, S.A. P.I. de C.V.**
- **Intergen Soluciones Energéticas, S.A. de R.L. de C.V.**

- **EVM ENERGÍA**
- **E2M Suministro Calificado, S.A.P.I. de C.V.**
- **Orden Cardinal, S.A.P.I. de C.V.**

- **Renovables Valor Agregado y Resultados Suministradora, S.A.P.I. de C.V.**

- **GPG Energía México S.A. de C.V.**
- **Hella Automotive México, S.A. de C.V.**

- **With a contract**

- **In the process of being signed**

- **Ammper Energía S.A.P.I. de C.V.**
Approx. 6.6 billion dollars of total investment.

15 states with investment in new projects.
What IS THE ELECTRICITY MARKET?

INTERNATIONAL COMPARISON

**Solar**

<table>
<thead>
<tr>
<th>Country</th>
<th>Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>130.6</td>
</tr>
<tr>
<td>India</td>
<td>115.4</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>98.8</td>
</tr>
<tr>
<td>Jordan</td>
<td>70.2</td>
</tr>
<tr>
<td>Peru</td>
<td>47.9</td>
</tr>
<tr>
<td>Brazil</td>
<td>57.1</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>50.0</td>
</tr>
<tr>
<td>South Africa</td>
<td>40.0</td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>29.7</td>
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</table>

**Wind**

<table>
<thead>
<tr>
<th>Country</th>
<th>Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>United Kingdom</td>
<td>145.5</td>
</tr>
<tr>
<td>Brazil</td>
<td>57.1</td>
</tr>
<tr>
<td>Australia</td>
<td>67.0</td>
</tr>
<tr>
<td>South Africa</td>
<td>48.8</td>
</tr>
<tr>
<td>Peru</td>
<td>37.3</td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>45.2</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>47.9</td>
</tr>
</tbody>
</table>

**Solar. Assigned Capacity (MW), 2016**

- 1st & 2nd Mexican Auctions: 3,483
- United Arab Emirates: 800
- Peru: 184
- India: 100

**Wind. Assigned Capacity (MW), 2016**

- 1st & 2nd Mexican Auctions: 1,406
- Australia: 200
- Peru: 162
CAPTURING MEXICO’S GEOThERMAL POTENTIAL:
SPECIFIC LAW AND GEOThERMAL BIDDING ROUND

BEFORE THE REFORM
(1959 - 2014)

ONLY 4 GEOThERMAL FIELDS IN OPERATION
1 GENERATOR IN 4 STATES

AFTER THE REFORM
(2014 - 2015)

4 + 2 EXPLOITATION CONCESSIONS
50% INCREASE

15 EXPLORATION PERMITS
11 FILED REQUESTS UNDER EVALUATION

4 GENERATOR IN 10 STATES
**TRANSMISSION NETWORK**

**TO BE STRENGTHENED OVER THE NEXT FIVE YEARS**

- **Strengthening** the network to interconnect the new power plants

- **Anticipating** the new infrastructure required to take advantage of **Clean Energy** resources

- **Istmo de Tehuantepec - Valle de México.**
  - 1st HVDC Line
  - 1st semester 2016

- **Angostura-Tapachula.**
  - 3rd HVDC Line
  - 2nd semester 2017

- **Back to Back asynchronous link 150 MW**
  - in Nogales, Sonora-Arizona, USA.

- **Cancún-Cozumel.**
  - Border Line.
  - 2nd HVDC Line
  - 2nd semester 2017

- **Tijuana - Cucapah.**
  - Baja California-SIN Interconnection.
  - 2nd HVDC Line
  - 1st semester 2017

- **Seri.**
  - Reinforcements.

- **Cumbres.**
  - Reinforcements.

- **Tijuana.**
  - Reinforcements.

- **Cancún.**
  - Reinforcements.

- **Cancún.**
  - Border Line.
  - 3rd HVDC Line
  - 2nd semester 2017

- **Seri.**
  - Reinforcements.

- **Cumbres.**
  - Reinforcements.
25,000 km expansion of the national transmission network:

- Total Interconnection
- Interconnection with North and Central America

**Required Investment in the Next 15 Years**

(Generation, Transmission and Distribution)

131.6 Billion US Dollars
Mexico has established:

- **Comprehensive Industrial Development Strategy** to foster the development of **new supply chains**

- **Human Resources Development Program:**
  - Scholarships: 60 thousand by 2018.
  - Global partnerships (Universities, Research Institutes, Companies)

- **5 CEMIES** (R&D clean energies)
  - 100 million invested.

- Mission Innovation goal: x2 R&D in Clean Tech
Mexico’s Energy Reform presents opportunities for *private and public investment* that add to approximately **137 billion USD**.

Key Challenges ahead:
1. Increase O&G production
2. Succeed in the creation of competitive markets
3. Implement a security of supply policy
4. Strengthen PEMEX and CFE
5. Generate benefits at the local level and develop value chains
6. Wider Public acceptance of the Reform