Overview of Mexico´s Energy Reform
June 6, 2017
Overview of Foundational Legal Reforms in the Mexican Energy Sector

► The constitutional amendment for the energy reform took effect in December 2013.
► Mexican President Enrique Peña Nieto submitted to the Mexican Congress a much-anticipated package of 9 new laws, as well as amendments to 12 existing laws in April 2014, to restructure the energy industry in Mexico and open up the power and oil and gas sectors to private participation.
► The Mexican energy reforms became effective in August 2014.
► The portions of the energy reforms that relate to the electrical power industry include three primary laws that create the framework for transitioning to open and competitive power markets in Mexico.
  ▶ Law of the Federal Electricity Commission (Ley de la Comisión Federal de Electricidad) - Transforms the CFE into a “Productive State Enterprise” and establishes guidelines regulating acquisitions, leases, services, budget and debt.
  ▶ Law of Coordinated Energy Regulators—Grants the Energy Regulatory Commission (CRE) independence and legal standing as well as technical, procedural and budgetary autonomy. The law is intended to facilitate CRE’s regulatory and technical oversight of the energy industry.

The Electric Industry Law (EIL), which became effective in August 2014, establishes a legal framework to foster competition and private-sector participation in all aspects of the Mexican electrical power industry.
► The EIL requires CFE restructuring via functional separation of generation, transmission, distribution and marketing activities. Each business unit must have independent governance along with strict legal separation from the other business units. CFE is permitted to continue participation across all industry activities, but, through separate subsidiaries, which would run as independent business units.
► While distribution and transmission of electricity would remain under the control of the state, CFE would be authorized, through subsidiaries, to enter into agreements and joint ventures with private parties for the financing, installation, maintenance, management, operation and expansion of the transmission and distribution networks.
► The EIL establishes a wholesale market for electricity to be operated by the National Center for Energy Control or CENACE.
Drivers of reform: High electricity prices, growing intensity, and need for capital investment

Industry remains the largest electricity user in Mexico in the New Policies Scenario, although buildings sector demand rises more quickly

Note: TWh = terawatt-hours.
Mexico is the world’s 7th largest car manufacturer, 4th largest exporter of cars and light trucks, and 2nd largest supplier of vehicles to the US (after Canada).
Mexico’s Power Sector Reform
(State-Governed Roles and Responsibilities)

**CRE**
Energy Regulatory Commission
- Transmission Operator
- Distribution Operator

**CFE**
(Federal Electricity Commission)
- Incumbent Generation & fuel assets
- Power supply & Legacy contracts

**SENER**
Ministry of Energy (Policy)

**CENACE**
(Nat'l Energy Control Center)
- Wholesale Market Operator
- Energy
- Capacity
- FTRs
- Bulk Power System Operator

Roles and Responsibilities:
- CRE: regulate the sector
- CFE: incumbent roles
c- SENER: policy
- CENACE: wholesale market, energy, capacity, FTRs
Mexico Energy Reform – Functional Separation

- **Generation**
  - Could be independent or provided by CFE
  - Historically owned by CFE as regulated service
  - In future, revenue realized through sale of:
    - Energy (MWhs)
    - Capacity (MWs)
    - Ancillaries

- **Transmission**
  - Assets owned by CFE
  - Now managed by one Regional Transmission Organization (RTOs) – e.g., CENACE
  - FTR opportunity to reduce cost (near-term) or trade (long-term)

- **Distribution**
  - Assets owned by CFE
  - Approximately 40M customers
  - Metering and billing done separately

- **Retail**
  - Energy and capacity sold to end users
  - Various geographic, calendar products around energy
  - Value added services offered (generators, retailers, etc.)
Energy market reforms timeline
Implementation schedule of Wholesale Electricity Market

<table>
<thead>
<tr>
<th>Transactions’ markets</th>
<th>Term</th>
<th>Product</th>
<th>Test / Award</th>
<th>Operation Entry</th>
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</thead>
<tbody>
<tr>
<td>Short Term - Virtual Offers Schedule</td>
<td>Energy / Serv. Related</td>
<td>2018</td>
<td>2018</td>
<td></td>
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<tr>
<td>Long term Auctions 15 years Energy</td>
<td></td>
<td>May 2016</td>
<td>September 2018</td>
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<tr>
<td>Long term Auctions 15 years Power</td>
<td></td>
<td>May 2016</td>
<td>September 2018</td>
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<tr>
<td>Long term Auctions 20 years CELs</td>
<td></td>
<td>May 2016</td>
<td>September 2018</td>
<td></td>
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<tr>
<td>Medium term Auctions 3 years Energy</td>
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<td>October 2016</td>
<td>TBD</td>
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<tr>
<td>Medium term Auctions 3 years Power</td>
<td></td>
<td>October 2016</td>
<td>TBD</td>
<td></td>
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<tr>
<td>DFT Auctions Per year / 3 years Financial Transmission Rights</td>
<td></td>
<td>November 2016</td>
<td>TBD</td>
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<tr>
<td>Capacity Market 1 year Power</td>
<td></td>
<td>February 2017</td>
<td>TBD</td>
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<tr>
<td>CELs' Market 1 year CELs</td>
<td></td>
<td>2018</td>
<td>2018</td>
<td></td>
</tr>
</tbody>
</table>

Source: SENER

Actions that directly impact clean energy

The obligation to purchase CEL for UCPM and SUC will start on 2018
Mexico energy market post reform structure

**Generation**
- Private Generators
- CFE Generator-WEM
- Intermediation Generator

**Power Trading, Hedging**
- Power traders

**Transmission**
- Regulated Tariffs

**Supplier**
- WEM
- Bilateral Contracts
- Long-Term Auctions
- Private Qualified Suppliers (SUC)
- CFE SUC
- Last Resort Suppliers (SUR)
- CFE SUB
- Qualified users
- Qualified users, Market participants
- Basic users

**Source:** SENER, EY


In 2016, total generation was 319,364 GWh, or 3.2% more than 2015, maintaining the same proportion of conventional (79.7%) and clean technologies (20.3%).

Electricity generation from conventional technologies increased by 3.2% in 2016 as compared to 2015, primarily driven by increased energy output from internal combustion (18.5%) and turbogas (8.2%) units.

Compared to 2015, generation of electricity from clean sources increased 3%. This was mainly due to a 20% increase in wind and a 33% increase in cogeneration units.

Dependency on natural gas grows

50% of Mexico’s power demand was satisfied with natural gas combined-cycle units.

Power Generation by CFE

<table>
<thead>
<tr>
<th>Category</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFEs’ power plants</td>
<td>55.2%</td>
<td>54.7%</td>
</tr>
<tr>
<td>Independent Production</td>
<td>28.8%</td>
<td>27.8%</td>
</tr>
<tr>
<td>Others</td>
<td>16.0%</td>
<td>17.5%</td>
</tr>
</tbody>
</table>

Electric Power Generation by type of Technology for 2016

- Combined Cycle: 10%
- Conventional Thermal: 11%
- Coalpower: 13%
- Turbogás: 9%
- Hydropower: 3%
- Eolic: 3%
- Others: 50%

Source: EY with data of PRODESEN

PRODESEN 2017-2031
2016 Installed Capacity Analysis
Generation Fleet expands 7.2% to 52,331 MW

KEY OBSERVATIONS:
- Fossil fuel units comprised 71% of the generation fleet
- Natural Gas combined cycle units grew by 13.4 % and now represent 37% of installed capacity
- Wind adds 930 MW (a 33% increase)
- Solar doubles, with utility scale increasing from 56 MW to 145 MW, and distributed solar increasing 114% (from 114 MW to 244MW)
- Hydroelectric equals 12,589 MW, a slight increase over 2015 (0.9%)
- Efficient co-generation more than doubles (from 583 MW to 1036 MW)
- Reliance on internal combustion units increases by 22.5% (from 1186 MW to 1453 MW)
- Nuclear capacity at the Mexico’s sole La Guna station expands 6.5% to 1608 MW

PRODESEN 2017-2031
CLEAN ENERGY MANDATES

► National Target: 35 percent by 2024, 50% by 2050 (includes existing clean resources)
► Clean energy defined as non-fossil fuel sources (with exception of natural gas co-generation and CCS)
► All electricity suppliers must procure Clean Energy Certificates
► Two long-term clean energy auctions expected to meet 39% and 56% of CEC obligations in 2018 & 2019, respectively
CENACE Long-Term Auctions: Two down, One to Go

As a result of the two Long-Term Auctions, 15 states will benefit from the development of new clean energy projects in Mexico.

- 34 companies from more than 10 countries, including Mexico
- 6.6 billion of investment in the coming years

Increase of 5,000 MW to the current generation capacity in Mexico.

Maximum Price VS Average Price

<table>
<thead>
<tr>
<th></th>
<th>First Auction</th>
<th>Second Auction</th>
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</thead>
<tbody>
<tr>
<td>Maximum Price</td>
<td>70</td>
<td>90,016</td>
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<tr>
<td>Average Price</td>
<td>48</td>
<td>32,258</td>
</tr>
<tr>
<td>Saving (%)</td>
<td>31.4%</td>
<td>64.1%</td>
</tr>
<tr>
<td>Clean Energy</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>Clean Energy</td>
<td>33.5</td>
<td>33.5</td>
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<tr>
<td>Package (Cumulative Energy + CEL)</td>
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<td></td>
</tr>
<tr>
<td>Package (Cumulative Energy + CEL)</td>
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</tbody>
</table>

Increase of 5,000 MW to the current generation capacity in Mexico.
The Mexican government maintains a centralized planning role for entire power sector. 15-year strategic plan (PRODESEN) projects $110 million USD investment for infrastructure projects.

- PRODESEN represents the Ministry of Energy’s 15-year strategic investment plan.
- 81% corresponds to generation projects, 11% to transmission projects, and 8% to distribution projects.
- Total investment is 9% less than 2016 PRODESEN projection.

Generation: 89,472 million USD
Transmission: 11,863 million USD
Distribution: 8,931 million USD

Estimated Investment For Electric Sector: 110,265 million USD

*Considering 18.5 MXN as the FX rate

Source: EY with data of PRODESEN
Natural Gas Will Dominate Mexico’s Energy Landscape
*(For the foreseeable future)*
Mexico’s natural gas production (primarily O&G associated) is in decline. Rising US imports account for 40% of supply.
Mexico’s National Pipeline System is Undergoing Substantial Expansion – 13 Projects through 2019

10 New Pipelines, which include 7 interconnections with US, and 1 interconnection with Central America
Independent System Operator (CENAGAS) Will Implement an Open Market Platform and Natural Gas Daily Trading System

Steps for capturing the daily natural gas transaction report:

1. Have a trading permit with natural gas as an authorized product.
2. Enter to “Natural Gas Marketing Report” through the Electronic Parts Office (OPE in Spanish).
3. Create “Compliance of obligation” for the corresponding company and permit according to the established schedule.
4. Enter the transactions of the indicated date using the form tool or by filling the downloadable template.
5. Validate the load, sign and send the report.
6. Review the information submitted, at: www.cre.gob.mx/transacciones_GN.html

In 2017, market participants will gain visibility to locational prices in 14 regions, through an interactive map available in the Transactions Report of Natural Gas website.
Transmission Interconnections to North and Central America

Mexico’s Interconnection Commission (SIEPAC) continues planning and collaboration with authorities in the United States and Central America to evaluate feasibility of additional interconnections, expanded coordination and alignment of energy markets.

Interconnections to 6 Different Systems

- Total Interconnections = 13
- California ISO (CAISO) = 2
- Southwest Power Pool (SPP) = 3
- Texas (ERCOT) = 6
- Belize = 1
- Guatemala = 1
- 5 of 13 are emergency interconnections along US border
Snapshot of Cross Border Trades

<table>
<thead>
<tr>
<th></th>
<th>Oil (mb/d)</th>
<th>Gas (bcm)</th>
<th>Electricity (TWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Canada</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.0</td>
<td>77.1</td>
<td>68.4</td>
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<tr>
<td><strong>United States</strong></td>
<td>3.0</td>
<td>77.1</td>
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<tr>
<td>Mexico</td>
<td>0.7*</td>
<td>29.9</td>
<td>1.7</td>
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<tr>
<td></td>
<td>0.7</td>
<td>29.9</td>
<td>1.7</td>
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</tbody>
</table>
Thank you

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