Introduction

The Mexican Wholesale Electricity Market (Mercado Eléctrico Mayorista, or MEM) started operations in 2016, first in the Baja California Interconnected System (BCA), on 27 January, then in the National Interconnected System (Sistema Interconectado Nacional, or SIN) on 29 January; and finally in the Baja California Sur Electric System (BCS) on 23 March. Since operations commenced, the National Center for Energy Control (Centro Nacional de Control de Energía, or CENACE), the electric system and electricity market independent operator, has been reporting hourly Local Marginal Prices (LMP) for approximately 2,360 nodes.

The MEM is currently a cost-based short-term energy market with a day-ahead market and a real-time market. To date, the former Mexican state-owned electricity company (Comisión Federal de Electricidad, or CFE) and, on a much smaller scale, some private companies, are participating in the markets. When the market began, CFE was bidding as a single company while it underwent separation into different generation companies (CFE Gencos I to VI). Currently, there are 18 registered generators participating in the MEM, 14 of which started this year, including the six CFE Gencos. There are five suppliers, including the basic service supplier, and many suppliers and retailers (non-suppliers) in the process of becoming participants.

For the second phase of the short-term energy market, an hour-ahead market will be added and constraints will be removed, allowing for free bids instead of cost-based bids. Phase two will become operational between 2017 and 2018, depending on the market component involved. The first capacity balancing market became operational in February 2017.
The graph below shows daily average LMP\(^1\) for the three Systems (BCA, SIN, and BCS) from February 2016 to July 2017. The lowest average LMPs are consistently found in the BCA. The highest average LMPs were generally found in the BCS because there is no natural gas available in the region; however, from May to July, the SIN’s prices spiked above the BCS prices. Several conditions could have contributed to the price increase, including lack of rain for hydro generation, fuel price increases, natural gas restrictions in some areas, as well as unavailable plants.

The average LMPs have shown an important increase in the SIN, from MX$847/MWh (US$47/MWh) in 2016 to $1260 (US$66) in 2017.\(^2\) Since the market started, the most volatile prices have been at BCS, with a standard deviation of MX$741/MWh (US$41/MWh), followed by SIN (MX$453/MWh, or US$25/MWh), and BCA (MX$171/MWh, or US$9/MWh).\(^3\)

Figure 1. Daily Average Local Marginal Price by System (pesos/MWh)

On average, from March 2016 to July 2017, the lowest LMP was in BCA ($296/MWh, or US$16/MWh). The highest was in BCS (MX$4,353/MWh, or US$239/MWh).
From April to June 2017, we saw important price increase in all of the SIN regions. The table below shows the weighted average price by SIN region in this period for the two years of operation of the MEM. The SIN regions that has seen the largest price increase is Peninsular in which the price more than doubled in comparison to the previous years. While it is reasonable to expect that the least expensive generation will be dispatched first, actual physical availability of the plants (including their fuel supply) and system constraints mean actual dispatch can result in expensive units (like old inefficient fuel oil plants) setting the marginal price. To date, a market monitor report explaining these price increases has not been published.

**Figure 2. Average LMP prices by SIN Region (pesos/MWh)**

April to June 2017

<table>
<thead>
<tr>
<th>SIN Region</th>
<th>LMP 2016</th>
<th>LMP 2017</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central</td>
<td>$877</td>
<td>$1,583</td>
<td>80%</td>
</tr>
<tr>
<td>Noreste</td>
<td>$832</td>
<td>$1,471</td>
<td>77%</td>
</tr>
<tr>
<td>Noroeste</td>
<td>$945</td>
<td>$1,411</td>
<td>49%</td>
</tr>
<tr>
<td>Norte</td>
<td>$899</td>
<td>$1,617</td>
<td>80%</td>
</tr>
<tr>
<td>Occidental</td>
<td>$886</td>
<td>$1,585</td>
<td>79%</td>
</tr>
<tr>
<td>Oriental</td>
<td>$881</td>
<td>$1,595</td>
<td>81%</td>
</tr>
<tr>
<td>Peninsular</td>
<td>$1,000</td>
<td>$2,148</td>
<td>115%</td>
</tr>
</tbody>
</table>

**Figure 3. Daily Average Local Marginal Price by Region (pesos/MWh)**
Since the market started operations, the maximum price reached MX$7,743.32/MWh (US$412/MWh) and was registered on 4 April 2017 for an hour in nodes at the Peninsular and Occidental regions. During that hour, 75% of the price was due to the congestion component and 4% was due to losses. The maximum LMP on BCA system (MX$6,734/MWh, or US$368/MWh) was registered on 24 August 2016 on 55 nodes of the system. The BCS system reached a maximum LMP of MX$4,490/MWh (US$251/MWh) on 30 June 2017 on the Loreto zone.

Regarding the capacity balancing market price, the relatively high reserve margin in Mexico, based on installed capacity, would indicate that the price of capacity should be zero or very low. Despite this, the prices resulting from the first balancing market for 2016 were $1.207 million pesos/MW-year ($63.5 USD/kW-year) for the SIN, $2.51 million pesos/MW-year ($132.1 USD/kW-Year) for BCA and $1.24 million pesos/MW-year ($65.2 USD/kW-year) for BCS. In case of the SIN, the prices were mainly due to the low availability of the plants and partly due to the unavailability of natural gas.

NERA offers market assessments for North American, European, and Asian markets and provides a full range of economic due diligence services. These include customized market price forecasts, review of contracts and fuel supply and transport arrangements, and operating margin projection, which lead to detailed asset valuation and risk assessment. In addition, NERA has vast experience assisting utilities, independent power producers, and government entities with market design and implementation issues.

Specific to Mexican wholesale energy market analysis, NERA offers a wide range of capabilities and can provide specific analysis that best fits a particular situation, whether it for region, load zone, or node.

Notes

1. The average LMP are weighted averages across the nodes in each system.
2. To compare the same months, we used February to July averages for both years.
3. The standard deviation is calculated for the period that the market has operated in each system, and the exchange rate is different for each system.
4. Monthly natural gas prices at Henry Hub increased on average, 44% in April to June 2017 versus April to June 2016.
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