



WHITE PAPER

Mexico: What Power Price Movements Mean for Reform

By Samir Succar



The Bottom Line

1. Power prices trajectories have broken with historical trends as a result of commodity price, generation mix, and political factors with significant implications for renewable development.
2. Mexico's reforms have the potential to transform the power sector. In light of power price trends, key areas to watch will be the design and implementation of the capacity market and the clean energy certificate mechanism.
3. The timeframes to launch phase one of the market are extremely ambitious. Successful implementation has the potential to attract significant capital to the sector because of strong market fundamentals and structural drivers for growth.

Executive Summary

Although ICF International remains bullish on the Mexico market, swift changes in power price trajectories make the capacity market design and the clean energy certificate market critical components of the forthcoming wholesale electricity market rules. Mexico stands at the precipice of a substantial transformation of its power sector, with reforms under way to establish an organized market, replace centralized procurement, and expand the role of independent power producers. The proposed market design elements released thus far contemplate the establishment of a three-year forward capacity market with elements that mirror U.S. regional transmission organization market structures. These reforms could fundamentally transform system operation, price formation and the management of resource adequacy. The changes also have the potential to incentivize significant volumes of new generation if the capacity market is well designed and if Mexico is able to address key infrastructure challenges associated with both transmission and distribution of electricity as well as midstream gas infrastructure. With market forces and political factors exerting downward pressure on wholesale costs and retail rates, the mix of technologies deployed will likely be a combination of efficient combined cycle generation and renewables—with the strength of the latter dependent on policy and economic drivers to provide continued momentum.

All Eyes on the Reforms

Mexico's energy reforms launched in late 2013 with goals that included facilitating private investment in the sector, stimulating economic growth, increasing competition, phasing out subsidies, and reducing energy costs to the economy. In the power sector, reform efforts have included a large-scale structural unbundling of the state utility, the establishment of an independent system operator for a new wholesale electricity market, and major infrastructure initiatives intended to facilitate a move toward natural gas and clean energy.

Phase one of Mexico's electric power market is scheduled to launch on January 1, 2016, with fully functioning markets for energy and ancillary services operated by the independent system



operator (ISO), CENACE.¹ The energy market will be nodally specified with locational marginal price based on separate components for energy, congestion, and losses. Called the “Bases of the Market,” the current draft of the first component of the wholesale market rules also contemplates separate market structures for capacity, financial transmission rights, and clean energy certificates (CECs per their Spanish name) to be launched in late 2015. Despite the sweeping scope of the structural changes contemplated in this short time, many critical details regarding the design of the market have not yet been finalized. Although the Energy Secretariat (SENER) submitted the first component of the market rules for stakeholder comments on February 24, 2015, these provide only the structural elements of the new market, with many of the most critical details awaiting publication of the subsequent “Market Practices Manuals,” “Operation Guides,” and “Criteria and Procedures of Operation.” These publications will provide important details regarding the nature of the capacity market design, the specific terms of the CEC market, and other key information that will profoundly affect the course of investment in the sector.

The government has pledged to release the final market rules in the summer of 2015 together with additional critical elements like the Development Program for the Energy Sector that will provide guidance on planning constructs. These timelines will leave a very short window to address a host of complex implementation issues. The reform effort has managed to stay on track despite numerous technical, procedural, and political hurdles, but the final stretch leading up to the launch of the market will be critical.

...Against a Backdrop of Major Market Shifts

The reforms are not the only catalyst for major structural change in Mexico’s power sector. Power price fluctuations, infrastructure constraints, and changes in generation mix already are having significant impacts as well. Market prices have declined steadily from 2013 to 2014, with wholesale marginal costs declining 29 percent nationally and more than 40 percent in five out of nine regions. This decline is in part a result of a recovery from drought conditions and associated downward price pressure from increased hydro dispatch, but even more significant are the political factors as well as the recent decline in oil and gas prices.

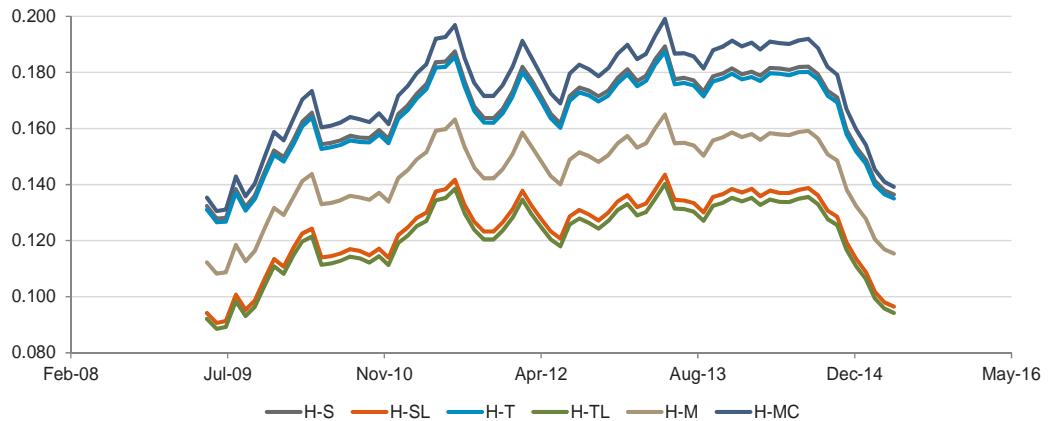
Mexico is projected to remain a net importer of natural gas from the United States, with pipeline capacity additions further strengthening the links between the two markets within the next three to five years. Natural gas pricing in Mexico is therefore linked to U.S. trading hubs, so price declines stemming from stateside expansion of production from unconventional plays have benefitted Mexican gas consumers. In order to amplify these benefits, the Mexican government has moved to expand pipeline capacity and installed capacity of natural gas fired generation. Furthermore, on March 25, CFE, Mexico’s national electric utility, pledged to reduce the use of fuel oil by 90 percent by 2017 relative to 2012 levels.² Fuel oil and diesel accounted for roughly 20 percent of Mexico’s generation as of 2012, but that proportion has already declined significantly in recent years with 2014 fuel oil consumption in the power sector already 43 percent below 2012 levels. Significant political pressure to lower retail electricity rates has further buttressed these trends, and all of these factors together have led to significant reductions in retail rate tariffs in recent months (Figure 1).

¹ CENACE (Centro Nacional de Control de Energía) was historically a division of the utility CFE that acted as the system controller, but under the reforms CENACE now becomes an independent entity tasked with the role of operating Mexico’s new wholesale power market.

² CFE. “FIRMAN LA CFE Y LA PROFEPA CONVENIO DE COLABORACIÓN EN MATERIA AMBIENTAL,” March 25, 2015, available at <http://saladeprensa.cfe.gob.mx/boletines/show/8218/>.



Figure 1: Mexico Retail Tariffs, Medium and High Voltage Customers, Regional Average Peak Rates USD/kWh, May 2009–May 2015



Source: CFE

The recent reduction in the short run marginal cost of generation is in part a result of declining fuel prices. The systematic phasing out of fuel oil within the sector will likely decouple the power sector from oil markets and remove oil price fluctuations as a significant source of price uplift in the future.

This move to phase out fuel oil also will further accelerate Mexico’s transition to natural gas as the dominant fuel for electric power if infrastructure expansion needs can be met. The natural gas pipeline capacity and electric transmission expansion needed to facilitate large-scale expansions of gas-fired capacity will be substantial (Figure 2). The Energy Secretariat projects that the rate of expansion of the backbone 230kV and 400kV transmission system during the next 10 years will need to accelerate by more than a factor of two relative to the levels realized over the 2008 to 2013 period (Figure 3). This rapid acceleration in power infrastructure development will likely require significant regulatory action to spur investments in transmission and distribution investment, provide transparent cost allocation mechanisms, and accelerate generator interconnection processes.

Figure 2: Changes in Interregional Transmission Flows 2014–2030

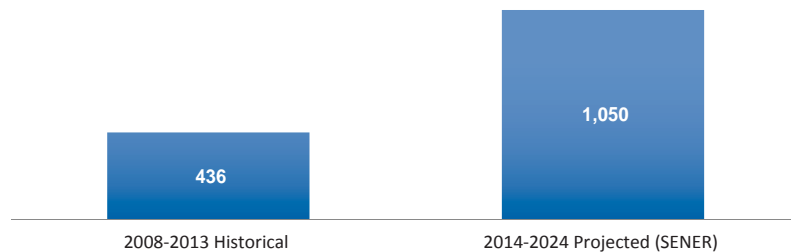




Price Trajectories Make Certain Reform Elements Critical to Watch

Given the backdrop of downward trends in power prices and the current trajectory of the market’s supply-demand balance, several elements of the reform will be especially critical for attracting capital to the sector. The impact of the new regulatory regime will be especially critical for renewable development in light of the significant role currently played by commercial and industrial (C&I) customers as offtakers for renewable projects. Although renewable energy technologies have received no direct price subsidies, they have benefited from the high retail rate tariffs for C&I customers procuring power through self-supply consortia. Historically, high C&I rates have provided significant headroom against which long-term contracts for power have been structured, while other market elements such as the energy bank provisions of the market have facilitated participation of variable energy resources like wind and solar. Therefore, the recent downward trends in retail rates (Figure 1), coupled with uncertainty around the future direction of the markets and mechanisms like the energy bank, have resulted in stalled momentum in renewable development.

Figure 3: Comparison of Historical and Projected High Voltage Transmission Build Rates (km-c/y, 400kV, 230 kV)



Source: SENER

The future of renewable development under the new regulatory regime will thus increasingly depend on policy constructs like the emerging CEL market to provide demand pull for renewables and clean energy more broadly. Although international experience with clean energy certificates has been mixed, the government has repeatedly signaled its commitment toward meeting the long-term clean energy targets³. Furthermore, the relatively long tenor of CEL contracts⁴ signals that the measures have political support and a financial structure that has the potential to provide a meaningful signal to the markets. Additionally, although SENER recently pulled back the 2018 CEL target from 8.2 percent to 5 percent⁵, the inability of generators operating under the prior regulatory regime to generate CELs does make the interim target more binding than it might appear. Finally, although the government’s 35 percent by 2024 goal for clean energy deployment has been in place since Mexico’s 2012 climate law, the government’s commitment to establish compliance mechanisms as part of the CEL market design has the potential to convert this target from an aspirational goal to a meaningful signal to the market. The details of the final design and implementation of these contract and compliance elements—together with the need to build significant transmission infrastructure necessary to accommodate increased transfers on the system (Figure 2)—will be key elements impacting clean energy development under the new market regime.

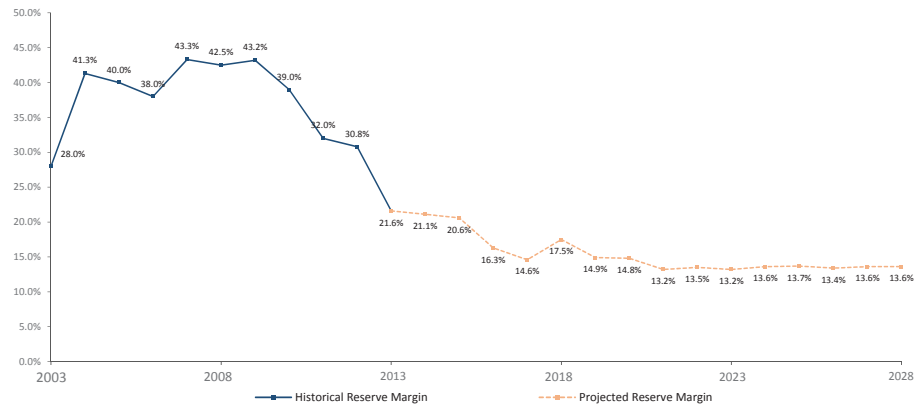
³ The 2012 Climate Law established a goal of achieving 35 percent of generation from clean energy (including nuclear and large scale hydro) by 2024.

⁴ The current draft “Bases of the Market” contemplates a 10-year tenor for CEL contracts.

⁵ SENER, “Se da a conocer requisito para la adquisición de Certificados de Energías Limpias en 2018,” available at http://sener.gob.mx/portal/Default_blt.aspx?id=3150.



Figure 4: Historical and Projected Reserve Margins



Source: SENER

A potentially even more important aspect of the market design in the long term will be the specific design attributes of the capacity market that is scheduled to hold its first auction in November 2015. The shift to gas generation and increasing participation of clean energy technologies with low or zero short run marginal cost are exerting downward pressure on energy prices. The establishment of the capacity market will be critical for bridging the gap between the infra-marginal revenues and the cost of new entry into the market. The reserve margin on the Mexican system remains north of 20 percent for the country as a whole, and select regions are significantly above this value. However, the historical trend shows the supply-demand balance trending off strongly supply-long conditions and toward equilibrium in the next five to 10 years (Figure 4). As Mexico moves toward market equilibrium in a low energy price environment, capacity price mechanisms will be critical for maintaining resource adequacy in the longer term. Therefore, with the release of final market rules in July and details around the formation of the demand curve shape, mitigation measures and other key market attributes will have critical implications for the future health of the overall market.

Structural Drivers for Growth

The Mexican power market has garnered considerable attention as an area for potential investment opportunity due to the anticipated impacts of the current reform process and the prospects for growth. Mexico is Latin America’s second largest economy with a GDP of \$1.3 trillion (2014). The country appears to have significant power sector growth potential with per capita installed capacity more than a factor of five below that of the United States⁶. Mexico’s robust load growth further underscores this potential: average annual increases in net generation of 2.4 percent from 2003–2013 are more than four times the U.S. average during the same period. Furthermore, Mexico’s Energy Secretariat projects that the growth in demand for electricity will accelerate to an average rate of 4.4 percent through 2028⁷. The country’s investment grade ratings (A3/BBB+/BBB+) have further stoked interest, as the recent reforms have moved to revitalize the economy and attract capital to the sector. Market fundamentals and structural drivers for investment and growth point toward significant

⁶The 2013 annual peak coincident load for Mexico’s national interconnected system (SIN) was 38.1 GW (CFE). In terms of U.S. wholesale markets, SIN is somewhat smaller than SPP and CAISO but larger than NYISO and ISO-NE.

⁷SENER, *Prospectiva del Sector Eléctrico 2014–2028*, December 2014.



opportunities in the sector:

- Expanded imports of gas from the United States create opportunities for combined cycles.
- The rate structure in Mexico is inverted—C&I rates are the highest. Many such entities seek to contract for supply.
- Deregulation is under way, creating more opportunities for hedge power sales to end users including transmission hedges.
- Marketization may create value at the end of the contract period.
- Greater emphasis on foreign investment and ownership in energy generally is a positive business trend and demonstrates interest in foreign capital.
- The low level of consumption per capita reflects potential for sustained growth.
- Greater infrastructure investment and transparency could lead to greater integration with the United States.
- Recent exports from Texas demonstrate optionality.
- Arbitrage between gas and power markets may become possible both across fuel sectors as well as across countries.

Anticipated investment needs stem from both the urgency of developing significant volumes of new generating capacity during this period⁸ as well as required upgrades to the transmission and distribution systems to ease congestion, reduce losses, strengthen interconnections to the Northwest and Southeast, and facilitate the integration of clean energy resources.

Conclusions

The pace and scope of Mexico's reforms are breathlessly ambitious, and their successful implementation has the potential to produce a transformation of the sector. Market fundamentals and the structural drivers for investment and growth suggest significant opportunities in Mexico's new market. The coming months will be critical for the success of Mexico's emerging competitive power markets. The energy sector reforms are taking place against a backdrop of dramatic structural shifts in the sector fuel mix, swiftly changing price dynamics, and a rapidly evolving supply-demand balance in the market. These conditions imply a strong role for infrastructure development necessary to enable these shifts and facilitate continued investment in the sector more broadly. The trends also suggest that the design and implementation of the CEL and capacity market structures will be key determinants of whether the reforms succeed in attracting significant volumes of new capital to the sector.

About the Author

Dr. Samir Succar is an expert with more than 12 years of experience in long-term planning and energy market modeling. He works on a host of issues spanning ICF's Energy Advisory, and Solutions practice including Mexico's wholesale and retail electricity markets, distributed energy resource integration, power system modeling, energy storage, gas electric integration, and wholesale market design.

⁸ Mexico's Energy Secretariat projects installed capacity nearly doubling from 60 GW in 2012 to 114 GW in 2028.



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Dr. Succar analyzes and models power market supply-demand fundamentals, develops forward price curve assessments, and performs generation asset valuations. His transactional experience includes acquisition support for potential bidders—largely private equity and independent power producers (IPPs)—and sellers of generation assets and portfolios. His prior research focused on the economics of low carbon baseload power from sources such as wind farms coupled to compressed air energy storage. Dr. Succar has a B.A. in Physics from Oberlin College and a Ph.D. in Electrical Engineering from Princeton University.

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