

**Marcelino Madrigal, Ph.D.**

Commissioner, Energy Regulatory Commission of Mexico (CRE)

**Prepared Remarks for**

Reliability Technical Conference, Docket No. AD17-8-000, June 22, 2017, Panel II

Panel II: International Perspectives

Presentations: Electric grids across the world are changing rapidly, given retirements of coal and nuclear generation, the addition of renewable and distributed generation, the decline in load growth, and increasing automation. In addition, countries around the world are introducing and expanding markets, improving transmission planning across international borders, and expanding pipeline infrastructure to facilitate additional gas-fired generation.

- a. What measures is your country taking to address these types of changes?
- b. How is your country implementing and managing distributed resources?
- c. What have been the challenges under your regulatory scheme? How have you responded?

Remarks:

1. The Energy Regulatory Commission of Mexico thanks FERC for the invitation to this conference, we consider cooperation and sharing of experiences among regulators key for the efficient and reliable development of our energy markets. Mexico and USA energy markets continue deepening their integration and we look forward to continue our cooperation for the shared benefits of our energy markets and consumers. The rest of the statements in this prepared remarks or during the conference are personal views and do not represent the Commission (CRE) position as a whole views, unless otherwise clearly specified.
2. **Strong policy support under recent market reforms and cost trends are paving the way for an unprecedented expansion of variable renewable energy in Mexico.** One of the legislative elements of the recent energy form, the Energy Transition law, calls for a minimum participation of clean energy in the mix of 25% by 2018, 30% by 2021, and 35% by 2024. Today, clean energy participation is about 20.3% including large hydro and one nuclear power plant. Wind power already contributes 3% of final energy consumption and solar, which increases its participation 157% in the last year, reached a 0.68% participation. In order to meet the increase clean energy to meet law requirements, two long-term electricity auctions have already been held over the past two years which led to contracts for an additional 5,721 MW capacity representing 4.5% of total energy consumption in 2016. Fifty-two new generation stations won contracts representing more added capacity than the additions over the past 8 years. Average prices for clean energy have been extremely competitive at 47.7 and 33.7 USD/MWh for each auction respectively. These contracts will mainly help meet the clean energy target of regulated consumers. Free consumers will also need to meet their targets via purchases of clean energy or certificates.

3. **The national control and market operator (CEANCE) has been taking steps to manage variability by improving operational practices and planning.** Operational experience has been gained with the interconnection of wind farms in the state of Oaxaca since the late 90s. The market rules have incorporated provisions so that variable resources send forecasts to CENACE (the system and market operator) who in-turn uses these predictions to produce an improved forecast for dispatch purposes. The most recent transmission plants already consider short-term variability of wind and solar and how transmission plants need be developed in response to such expected variability. Projections of solar penetration specially are one of the factors driving transmission additions in the mid-term expansion plan. In addition, Mexico, USA, and Canada are performing with the help from NREL, a longer term North America Renewable Integration Study (NARIS) that aims at identifying synergies for operations and planning across borders as well as technical solutions to larger shares of renewables in North America.
  
4. **Distributed generation is also growing rapidly and consumers' right to produce their own energy and access the grid is guaranteed via schemes whose implementation costs are not a de-facto prohibition. The schemes should evolve at the appropriate time to ensure efficient cost recovery.** Distributed generation doubles almost every year since 2013, more than 29 thousand installations have added already 247 MW of distributed generation and the scale of the projects has grown from an average 5.4 kW to 10.3 kW. The commission recently issued new distributed generation rules, which keep net metering provision with the added feature that distributed resources, can sell their excess or all the production to the energy spot market. While distributed generation has been growing exponentially, it still represent only about 0.02% of total energy demand. As the market matures and information technologies become available and operable by distribution companies for lower consumption consumers, simpler schemes such as net metering represent an effective way to guarantee consumers right to produce their own electricity. Keeping in mind that potential effects of distributed generation on network cost may raise in the future, the commission set a sun-set clause to review and possibly modify such rules in the future as penetration of distributed generation grows. While there is a clear understating that distributed generation assets should be fully merged in market, current mechanisms, readiness levels by consumers, the market operator, and distribution operator, do not guarantee that a different mechanism will not represent a barrier that makes it unfeasible to consumers to exercise their right to produce their own electricity.
  
5. **As part of the energy reform, grid interconnection and expansion rules have been revamped to ensure nondiscriminatory access and reliable cost effective growth of the grid with.** A new interconnection process was issued in which connecting parties have a clearly laid out process for the interconnection. The process –previously run by the transmission utility–, is now independently run by the system operator. The new rules

provide individual, grouped look-ahead interconnection, or interconnection orders as part of the yearly expansion plan. Transmission expansion plans are issued by the ministry of energy and consider the technical input of both the system operator and our regulatory commission. This brings much needed change to ensure there is enough transmission, it can be accessed by all parties, and all under reasonable pricing and service rules already issues by the commission.

6. **Enabled by Commission approved rules on cost recovery for transmission expansion projects awarded via auctions, competition for transmission expansion projects will start this year and with that increasing the capacity of our grid to serve demand, meet clean energy requirements, and improve its.** Transmission networks need to grow to accommodate demand growth, renewable energy development, and reliability. The commission has issued rules with the main design features of auctions that will be carried out to competitively award transmission expansion projects under the new association and contracting schemes allowed by power sector reform. The rules also describe how winning bidders' annual revenue requirements are added to the system overall transmission network revenue requirements and recouped via transmission rates. The new scheme will bring needing competition to ensure transmission expansion is achieved at the lowest cost possible. The first project to be launched under this scheme is a 1000-plus kilometers HVDC transmission line from a highly dense wind power area to the center of the country.
  
7. **CRE as the national reliability authority has introduced the first grid code to ensure variable renewable energy technologies cooperated in a balanced manner with grid operations.** Our current reliability rules have been developed taking into consideration the long-standing tradition and knowledge of the main utility (CFE) and its system operator, now a separate legal entity. The grid code, which is a short description of a longer name of the instrument ("general rules and criteria for efficiency, quality, reliability and continuity of the national electricity system") includes our reliability requirements in terms of planning, operation, inter-operability, connection requirements for loads and generation assets, among others. Given the speedy introduction of variable generation resources our interconnection requirements drew from experience gained with first the first wind installations and also from international experience. This is to make sure we have the right requirements and front-line generation technologies that can cooperate with system operations to maintain or improve reliability. Among some of the requirements are advanced LVRT capabilities, frequency control, and smart-inverter-like features for distributed generation. The commission is performing its first annual review of the state of reliability which will collect experiences and recommend updates, if found necessary, to the reliability requirements.
  
8. **CRE is deepening the collaboration with NERC and FERC on knowledge and experiences exchange on reliability standards setting, compliance, and cybersecurity.** On October 2016, the Commission hosted a High – Level, USA, Mexico, and Canada, trilateral meeting to discuss activities regarding reliability in North America. Since then two new collaboration agreements have been signed in order to collaborate on reliability matters:

- On January 7th, 2017. The DoE, FERC, the Ministry of Energy in Mexico (SENER), CRE and CENACE, signed the “Principles to promote the reliability and security of the interconnected power systems of the USA and Mexico”. The objective of the Principles is to promote the reliability and security of the interconnected electric power system in North America.
- On March 8th, 2017. CRE, CENACE and NERC, signed a Memorandum of Understanding with the objective to exchange experiences and best technical and regulatory practices on reliability, such as, physical infrastructure protection, cybersecurity, operation and planning with the integration of renewable energy, among other.

Such collaboration is already helping us understand practices and regulations to maintain grid reliability in the presence of large shares of variable renewables and start understanding and addressing risks and potential responses to other issues such as cybersecurity.

- 9. A free market for gas supply and commercialization is developing in Mexico and advanced operational rules –grid code-- for the interconnected gas system are under development. Gas supply will continue to be key in the mid-term for competitiveness of energy prices and for managing the grids with larger shares of variable resources.**
- In 2016 national demand of natural gas was 7.78 Bcfd. The demand was met with 3.531 Bcfd of national production and 4.249 Bcfd of imports mainly continental gas from the USA. Imports represented about 55% of total demand. National production came mainly from Pemex, the national oil company. Conditions prevailing in the past years, with limited imports capacity from the USA, limited number of players, limited LNG facilities, and no additional national gas production players at that moment, required keeping regulated the price and terms and conditions of sales by the mayor natural gas producer, Pemex. This is gradually changing. As part of the energy reform and the asymmetric regulation provisions in the law, the commission initiated the instrumentation of Pemex commercialization portfolio cession. The program calls for 70% of Pemex commercialization portfolio volume to be released to other commercialization participants, all under a transparent and open random balloting process. Up to today, 20% of Pemex’s commercialization portfolio has been released under the program; the program will continue its implementation. In addition, USA-Mexico a first cross-border pipeline capacity has been auctioned to third parties. Out of 0.73 Bcfd put into auction 0.21 Bcfd of capacity has been granted to other than Pemex players. The commission is currently evaluating lifting price regulations to Pemex and with that the wholesale price of natural gas in Mexico to be fully de-regulated this year. Asymmetric terms and conditions to Pemex will continue to be implemented to make sure the market further develops. As the interconnected natural gas pipeline system in Mexico is quickly growing and a system of pipeline capacity rights is enters into force, the gas system operator (CENAGAS) is preparing a grid code rules to ensure the reliable operation of the gas network and market. As more pipeline capacity is freed to third parties, more pipelines are completed, and additional gas production comes online from other parties –such as new actors from the oil round auctions--, a more liquid and competitive market for natural

gas in Mexico should evolve. This will leave many years of price regulation and monopoly in gas productions and imports behind. Natural gas supply is important for our power mix (more than 40% of energy mix in 2016 was produced by natural gas) and the manufacturing industry, helping both controlling emissions and managing the power grid as variables increase their participation.

- 10. Mexico's ministry of energy (SENER) –the policy marker in the energy sector–is considering developing a natural gas security of supply policy completing security of supply policies for all energy sectors.** As part of the implementation of the energy reform, the ministry of energy is considering developing a natural gas security of supply Policy, which among others, could include minimum natural gas storage quotas. A policy in the transportations fuels market is already under review and consultation. In the power sector a security of supply policy is already in place, which calls for appropriate planning reserves margins to be achieved by the various security of supply mechanisms put in place in the electricity market (long-term energy and capacity auctions, short-term capacity market, and the last resource emergency capacity auctions).
- 11. Increased cooperation amongst CRE, state and federal regulators in the USA, will be key to continue strengthening the development of our gas markets for the mutual benefits of our energy consumers.** As our gas energy systems become more interconnected more cooperation will be needed to improve how our markets and system can talk to each other on the commercial and technical fronts such as access rules. On the electric power side, given the opportunities of the recently open market, there is increased interest to trade across border with Mexico and this will also require more coordination on cross-border transmission cost and capacity allocation. Our cooperation with California and the WECC and NERC prove that interconnected markets can be beneficial for consumers and the reliability of the grids.
- 12. Thanks again for the invitation to speak at this conference and look forward to a fruitful exchange of ideas.**