



CALPINE CORPORATION

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HOUSTON, TX 77002

February 5, 2019

Via E-mail

The PJM Board of Managers
c/o Ake Almgren, Ph.D., Chairman
PJM Interconnection, L.L.C.
2750 Monroe Blvd.
Audubon, PA 19408

Dear Chairman Almgren and Board Members:

I am writing to you today to provide Calpine's views on PJM's efforts to improve its reserve market pricing. Given the Board and PJM management's commitment to addressing the shortcomings of the reserve market and the Board's directive to PJM management to wrap up the stakeholder process and prepare a filing with FERC, we thought it would be beneficial to the board to understand Calpine's perspective on these issues.

I would like to commend the Board and PJM management for identifying energy price formation issues as a top priority for PJM, and the dedication you have shown to the issue for the last several years. The process to consider energy and reserve price formation commenced in 2014 in response to FERC's initiation of a proceeding to evaluate issues of price formation in RTO and ISO markets. Numerous stakeholders, including Calpine, participated in the PJM process which led to, among other things, PJM introducing a problem statement in December 2017 that identified the need to study reserve pricing:

PJM recommends investigating energy and reserve price formation enhancements, including how energy and reserve prices are calculated and how prices are formed during shortage conditions, which could more transparently reveal the true cost of meeting system reliability needs.

Stakeholder meetings commenced in early 2018 and continued into 2019. While the problems identified and solutions proposed have evolved over time, PJM's continued commitment to the issue has culminated in the reserve pricing and Operating Reserve Demand Curves (ORDC) proposals currently under consideration by stakeholders.

Recently, some groups have asserted that the stakeholder process was rushed and insufficient time was devoted to the process. We disagree. With more than one year of stakeholder discussion on these very important topics, we believe that PJM has provided sufficient opportunity for stakeholders to address and debate these issues.

Calpine is generally supportive of PJM's reserve pricing proposal, and the changes will likely meet the goal of enhancing system reliability while transparently and accurately compensating resources for providing flexibility. These are necessary reforms that should be filed with FERC as soon as possible.

However, Calpine does oppose one specific aspect of PJM's proposal: the Capacity Transition Plan ("CTP"). Under the CTP, rather than using historical data to determine the Energy and Ancillary Services

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(EAS) offset to calculate Net CONE, which is a fundamental driver of PJM's capacity market, the CTP uses a computer simulation of what the EAS revenues would have been had the new energy reserve products been in place over the past three years. Based on Calpine's experience in the ERCOT market, such simulations may diverge significantly from reality, and do not take into account behavioral changes due to implementation of the new ORDC and reserve products. Furthermore, PJM's simulation is a real-time market simulation and does not consider day-ahead price impacts. For these reasons, Calpine is very concerned the CTP will create lower capacity prices based on computer simulations of markets that do not yet exist, and may have other dynamics than those originally anticipated.

In order to address concerns about the CTP as well as higher costs resulting from the new pricing, Calpine has been working with other stakeholders to reach a compromise solution that reduces the expected value of the ORDC during the first few years of implementation in exchange for elimination of the CTP. We are hopeful such an approach can gain significant stakeholder support.

In conclusion, I would like to thank you and PJM management for conducting a comprehensive stakeholder process on energy and reserve pricing, for your consideration of our position on the reserve pricing proposal, and for your continued commitment to competitive wholesale energy markets.

Sincerely,

A handwritten signature in black ink, appearing to read 'Thad Hill', with a stylized flourish extending to the left.

Thad Hill

President and Chief Executive Officer