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PROJECT NO. 54335

REVIEW OF MARKET REFORM ASSESSMENT PRODUCED BY ENERGY AND ENVIRONMENTAL ECONOMICS, INC. (E3)	**§**	**PUBLIC UTILITY COMMISSION OF TEXAS**

JUPITER POWER LLC'S COMMENTS REGARDING THE REVIEW OF MARKET REFORM ASSESSMENT PRODUCED BY ENERGY AND ENVIRONMENTAL ECONOMICS, INC. (E3)

Introductory Comments on Market Design

Jupiter Power LLC ("Jupiter Power") appreciates the opportunity to submit comments regarding the Assessment of Market Reform Options to Enhance Reliability of the ERCOT System prepared by Energy and Environmental Economics, Inc. ("E3"). We recognize that the comments were not timely filed by the Noon, December 15, 2022, deadline and regret not being able to meet the deadlines established by the Commission, due to external circumstances. We appreciate the hard work of Commission staff and Commissioners to incorporate feedback and file these comments as record of Jupiter Power's positions ahead of the January 12, 2023, Open Meeting and the 88th Texas Legislative Session, convening on January 10, 2023.

Jupiter Power is an energy storage developer and operator in the ERCOT market. Since Winter Storm Uri, beginning in June of 2021, Jupiter Power has achieved commercial operations on 427MW/655Mwh of battery energy storage projects in the ERCOT market. During Winter Storm Uri, there were 225 MW of energy storage in ERCOT in total. By July of 2022, when summer conditions required two conservation requests to the public, there were almost 1650 MW of battery energy storage synchronized to the ERCOT grid, with a reported average real-time contribution of 947 MW to Physical Responsive Capability (PRC) during the hour of tightest reserves on July 13, 2022, the day of one of the conservation requests.[1]

Battery energy storage systems in ERCOT provide both energy and ancillary services and respond instantaneously. The ability to dispatch power instantaneously with the flip of a switch offers customer affordability by matching sudden needs of the grid with efficient generation and addresses frequency imbalance, often caused by thermal outages, higher than forecasted load, or lower than forecasted renewable output, which also cause the hours of highest reliability risk in ERCOT.

Since Winter Storm Uri, much work has been dedicated to increasing both operational reliability and reliable market performance in ERCOT. During the 87th Legislative Session, the Texas Legislature passed the historic Senate Bill 3 ("SB3"), legislation to enhance reliability in the ERCOT market, including preparing for, preventing, and responding to weather emergencies and widespread power outages. Since the Governor signed Senate Bill 3, the Public Utility

[1] SAWG CDR and SARA Review 12-13-2022, https://www.ercot.com/files/docs/2022/12/12/3__SAWG_CDR_and_SARA_Review_12-13-2022_.pptx

Commission of Texas ("PUCT") has made significant changes to the operational rules for market participants, from weatherization to critical load designations, and to wholesale market design in "Phase I" of their Market Design Blueprint.

Before deciding on a path and embarking on "Phase II" of the Market Design Blueprint, it is important to take stock of the effects to or investment in the market attributable to the significant work and changes that made up "Phase I." Notably, "Phase I" included lowering the HCAP and VOLL from $9,000 to $5,000, shifting the Operating Reserve Demand Curve ("ORDC") such that the Minimum Contingency Level is set at 3,000MW, and expedited implementation of ERCOT Contingency Reserve Service ("ECRS"). These "Phase I" improvements have tremendous market impacts, the entirety of which have not yet been realized.

Discussions regarding market design reform of the energy-only market into a capacity construct have been raised before both the PUCT and the Texas Legislature for at least 10 years. Following a 2012 Brattle study on resource adequacy and subsequent discussions at the PUCT and Texas Legislature, the Operating Reserve Demand Curve was adopted in 2014 as a compromise intended to provide the revenues necessary to provide resource adequacy by generators. Since initial implementation, the ORDC has been shifted to further increase generator revenues twice, first in 2019 and second with the shift that was implemented on January 1st of this year. At the December 5, 2022, Texas House State Affairs Committee hearing, the Independent Market Monitor to ERCOT stated that it would have taken an increase in the HCAP and VOLL from $9,000 to $20,000, instead of lowering it from $9,000 to $5,000, to produce revenues equivalent to those seen since January 1, 2021, due to the change to the ORDC. The market has not yet had time to realize whether these increased revenues from the ORDC will result in increased investment in dispatchable generation.

However, also, in the time since Winter Storm Uri, beginning in the summer of 2021, ERCOT has been adhering to "conservative operations," out-of-market actions procuring higher levels of ancillary services, especially Non-Spinning Reserve Service ("Non-Spin") and Reliability Unit Commitments ("RUCs"). The Independent Market Monitor noted that procurement of Non-Spinning Reserves between August of 2021 and July of 2022 has cost between $800,000,000 and $1,000,000,000.[2] In addition to costing consumers, deployment of Non-Spin and RUCs remove money from the energy market, which suppresses the energy price signals needed for developers and operators of generation to continue to invest in the ERCOT market. These out of market actions remove money from the energy market and have and will continue to dampen signals for increased generator investment that might otherwise result from allowing price signals causes by high demand to incentivize increased capacity, as envisaged under the energy-only and ORDC market constructs.

As we consider larger-scale market design changes for "Phase II" of the market design blueprint, Jupiter Power believes the following are important considerations:

1) <u>The Phase II Market Design Proposal Should Solve for the Correct Problem</u>

[2] December 5, 2022, Texas House State Affairs Committee Hearing, https://tlchouse.granicus.com/MediaPlayer.php?view_id=46&clip_id=23711

The problems we should be trying to solve for in ERCOT should be forward-looking issues of operational uncertainty. ERCOT does not have an installed capacity problem – E3's report uses a reliability standard of Loss of Load Expectation and calculates that our current LOLE is 0.03 or .03 days or events of loss of load in ten years yet provides solutions for a 0.1(one day or event in ten years) LOLE reliability standard. We should solve for the hours of highest risk or highest uncertainty, which result in peak net load.

2) ERCOT Market Design Should Provide "Peak" Price Incentives in Order to Incent Peaking Dispatchable Generation

In order to incent new dispatchable generation that would be available for peak hours of high risk and high uncertainty, market design needs to provide peak prices for those generators. In an energy-only market, the prices that incent peaking plants should be literally "peak" price, resultant from real-time energy prices plus the ORDC, which indicate the times of highest operational need. For the highest times of operational need, we need to ensure dispatchable generation receive price signals that indicated that they are needed both in that real-time moment and enough for future generation build.

Section 39.159, Utilities Code, adopted as part of Senate Bill 3 provides that "a generation facility is considered non-dispatchable if the facility's output is controlled primarily by forces outside of human control." Battery energy storage systems output are not controlled primarily by forces outside of human control, and clearly constitute dispatchable generation as defined by SB3. In ERCOT, battery storage provides a significant portion of ERCOT's ancillary services like Responsive Reserve Service and Regulation Service and did through during times of high demand this summer.[3] In relevant part, SB3 provides that the commission shall ensure that ERCOT "periodically, but at least annually, determines the quantity and characteristic of ancillary or reliability services necessary to ensure appropriate reliability during extreme heat and extreme cold weather conditions and during times of low non-dispatchable power production in the power region" and "procures ancillary or reliability services on a competitive basis to ensure appropriate reliability during extreme heat and extreme cold weather conditions during times of low non-dispatchable power production in the power region." Jupiter Power believes that Phase I Market Design has made great strides toward achieving these goals by expediting implementation of the ERCOT Contingency Reserve Service ("ECRS"). Upon implementation of ECRS, fast-responding technologies such as two-hour storage can be used in the ancillary services market to provide even greater value in stabilizing the grid to address ramp up and ramp off periods of solar, which increasingly coincide with the hours of highest uncertainty and highest net load in the ERCOT market. An ERCOT presentation, filed by Commissioner McAdams in this PUCT Docket No. 52373, indicated that total solar installed capacity is projected to increase by ~24,000MW by 2023, taking ERCOT to -30,000MW of solar generation online in 2023. The same presentation shows that the Max Load Up Change and the 98a Percentile Net Load Up Change for 60 mins (and likely to be correlated with sunset hours),

[3] Summer 2022 Operational and Market Review, ERCOT Board, October 18, 2022, https://www.ercot.com/files/docs/2022/10/11/6%20Summer%202022%20Operational%20and%20Market%20Review.pdf

associated with the presence of 30,000GW solar, are 22,417 MW and 15,141MW respectively.[4] We encourage full realization of SB3 regarding ancillary services, including possible expanded procurement of ECRS or regulation service and exploration of an uncertainty product for ramping. If an uncertainty product is implemented, this could allow for ancillary services to be procured on an even more competitive basis by allowing for the current duration requirements on Non-Spin and ECRS to be removed and for price-suppressing RUCs to be reduced.

3) Policy Decisions on ERCOT Market Design Should be Made on a Technology Neutral Basis

Market design should be technology neutral. This approach produces market efficient outcomes that go towards customer affordability because it allows all resources compete to provide the lowest cost solution to meet the different reliability needs of the grid. SB3 directed that the Commission "develops appropriate qualification and performance requirements for providing services...including appropriate penalties for failure to provide services." Jupiter Power supports a market design that is technology agnostic, which is consistent with historic market design policy in ERCOT and allows for new innovation to enter the market. Technology neutrality should mean that each technology of generators can provide the service needed on the grid that their technology is best suited to provide, in order to allows for sufficient revenues for that technology to continue to invest in ERCOT, and thereby increase reliability with the advances in new technology. For example, dispatchable battery energy storage systems need sufficient revenues from the energy and ancillary services that they produce instantaneously at times of highest need to remain in the market and continue to invest in battery energy storage of longer duration. Integrating new battery technology has contributed to alleviating reliability issues in ERCOT, like transmission constraints and frequency imbalance, through the competitive market. ERCOT's highly sophisticated energy only market operates on a nodal level, meaning price is localized so those prices signals tell us to locate our batteries very specifically where there is the biggest price delta at a node, indicating places where there is a common mismatch in supply and demand, and often transmission constraints. These very specific price signals are especially important to battery developers. In this way, the current energy-only market addresses very local reliability needs, as well as system-wide reliability needs. For example, through local nodal price signals, a battery located on the load side of a transmission constraint could serve to address the local issue of transmission constraining available generation, even if system-wide generation reserves are very low.

Additionally, we design ancillary services in ERCOT, as well as our day-ahead market, for the characteristics required for reliability without designating winners and losers at the outset. If appropriate penalties for failure to provide are in place, different technologies can then do their own risk calculus for being able to provide services with certain characteristics and still preserve overall reliability. For example, until the passage of NPRR1096 Require Sustained Two-Hour Capability for ECRS and Four-Hour Capability for Non-Spin, a QSE scheduling its resource(s) manages the risk associated with complying with their provision of ancillary services to that duration. For example, if a QSE were to offer four hours of Non-Spin, and those were called, but the QSE was only able to offer one hour of Non-Spin, there would be severe monetary and

[4] Commissioner McAdams Memo" with attachment "Impact of Growth in Wind and Solar on Net Load, ERCOT Staff, October 25, 2021, WMWG," filed November 3, 2021, by Commissioner McAdams, in Docket No. 52373 https://interchange.puc.texas.gov/Documents/52373 244 1165389.PDF

compliance penalties via the Supplemental Ancillary Services Market and/or subsequent enforcement investigations by the Independent Market Monitor, the reliability monitor, and the PUCT.

Answers to Commission Staff's Questions:

QUESTION:

1. **The E3 report observes that the Performance Credit Mechanism (PCM) has no prior precedent for implementation, does this fact present a significant obstacle to its operation for the ERCOT market?**

RESPONSE:

The fact that the PCM has no prior precedent for implementation alone may not present a significant obstacle to its operation for the ERCOT market. However, a whole-scale change, like the PCM, LSEO or FCM would require many decisions prior to implementation that were not assumed in the E3 report. These include decisions that may limit the number of market participants able to participate in the PCM and the extent to which they participate, and what financing can be secured for additional dispatchable battery projects in anticipation of the potential implementation of the PCM. To that extent, Jupiter Power requests that there is a clear roadmap for when and how these implementation decisions will be made and with what stakeholder impact.

QUESTION:

2. **Would the PCM design incentivize generation performance, retention, and market entry consistent with the Legislature' s and the commission' s goal to meet demand during times of net peak load and extreme power consumption conditions? Why or why not?**

RESPONSE:

The PCM as modeled by E3 consists of:

- A forward-looking requirement assessment for a system that meets the 0.1 days/year LOLE reliability standard, using a number predetermined number of hours, on an annual basis
- A price to procure PCs based on an administratively determined demand curve designed to yield revenues of net-CONE per unit of effective capacity for a system at the 0.1 days/year LOLE reliability standard
- After the operating year, PCs are awarded to generators based on a lookback at their availability across the highest risk hours, measured as the hours of lowest incremental available operating reserves.

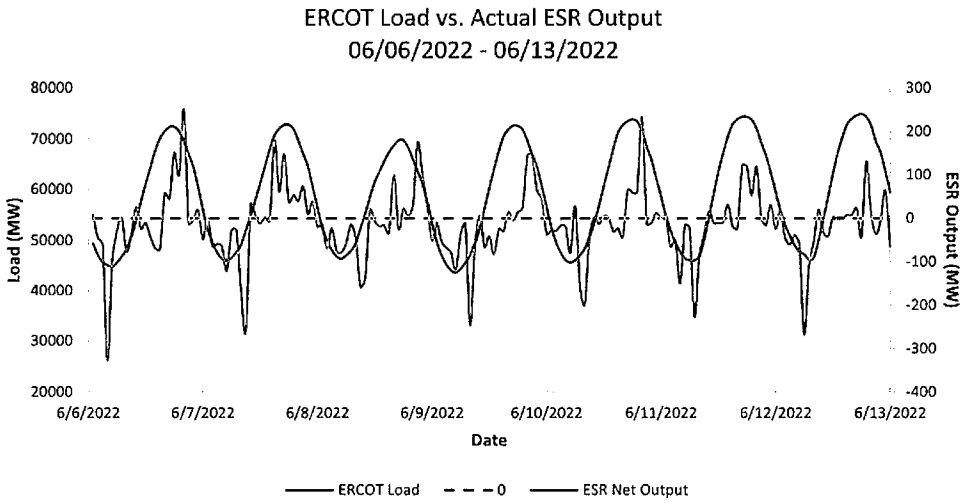
While a Performance Credit Mechanism ("PCM") might incent the same behaviors as the energy only market does, by incenting generators to be online and available during hours of highest need through financial reward, the PCM would at the same time be suppressing energy and ancillary service prices that incent those behaviors. If a new market design suppresses those peak prices, it must account for contracted revenues in order for developers to have the regulatory certainty needed to finance new dispatchable energy projects in ERCOT. Jupiter agrees with

Wattbridge that "lenders will view it (PCM) no differently than merchant energy and ancillary services revenues and discount them accordingly, resulting in continued hurdles to financing new generation project development."[5] The PCM does not solve a capacity problem if it does not provide contracted revenues needed to build new capacity and may not solve an uncertainty problem if it suppresses the energy signals that are relied on currently to build new dispatchable generation. In order to ensure new market entry, a design must provide enough certainty for revenues, either through established market principles or contracted revenues, for those building new market entrants to secure financing. Lenders will likely view the PCM as a merchant mechanism without the historical performance of current merchant energy and ancillary service. Further, a PCM with a higher amount of uncertainty might result in higher potential exposure and higher collateral requirements that may limit the number of market participants and each market participant's ability to participate.

E3 modeled the 30 hours of highest risk and defined highest risk as "the hours of lowest incremental available operating reserves." E3 noted that the hours are not exclusively aligned with peak net load. As the resource mix changes, the hours of lowest available operating reserves will reflect the hours or highest thermal outages. However, Phase II of the Market Design Blueprint, does not seem to be intended to address operational problems caused primarily by the hours of highest thermal outages. In shoulder seasons especially, highest peak net load will not equate to highest load plus highest thermal outages. The PCM should address higher than forecasted load, as well as low load times that may have lower than forecasted renewable energy output or large and unexpected forced outages or regional issues cause by local transmission stability. In addition to equating "highest risk" to peak net load, the PCM could also be enhanced by a monthly instead of yearly procurement. Each month carries a different amount of uncertainty, and that uncertainty is different in its characteristics from month to month. For example, the uncertainty in July might be the amount of load due to air conditioning usage, while in May the uncertainty might be the wind forecast. Jupiter Power proposes that the risk hours be determined monthly instead of yearly and would support exploring a construct of two to four highest risk hours a month.

Jupiter Power also notes that E3 modeled "net peak load" as "the maximum total electricity demand in a system during a specified time period (usually a year), net of wind, solar, and storage generation."[6] We disagree with this definition as reports from this summer already show that storage contributes to generation that corresponds with times of high gross load and does not net from it. See below chart from ERCOT for how battery storage generation corresponded with gross load.

[5] Wattbridge Energy's Responses to PUCT Staff Questions Issued on November 9, 2022, PUCT Docket No. 54335
[6] "Assessment of Market Reform Options to Enhance Reliability of the ERCOT System," E3, page 22



[7]

QUESTION:

3. **What is the appropriate reliability standard to achieve the goals stated in Question 2? Is 1-in-10 loss of load expectation (LOLE) a reasonable standard to set, or should another standard be used, such as expected unserved energy (EUE). If recommending a different standard, at what level should the standard be set (e.g., how many MWh of EUE per year)?**

RESPONSE:

Jupiter Power believes that the reliability standard should be designed specifically for ERCOT and the problem that the Texas Legislature intended to address with SB3 based on Winter Storm Uri and on looking to future times of high risk and uncertainty due to our changing generation mix and changed patterns of load usage. In their December 1, 2022, letter to the Public Utility Commission, the Texas Senate Business & Commerce requested "the Commission first take action to define the reliability goals for the ERCOT region prior to moving forward with any significant market redesign." Jupiter Power supports moving forward with a process to define the reliability goals and standards for the ERCOT region and looks forward to participating in that process.

QUESTION:

4. **The E3 report examines 30 hours of highest reliability risk over a year. Is 30 the appropriate number of hours for this purpose? Should the reliability risk focus on a different measure?**

RESPONSE:

[7] ERCOT SCR822 – ESR Integration Report

See Jupiter Power's response to Question 2. We believe that the number of hours should be set by month and recommend two to four hours per month.

QUESTION:

5. **Over what period should the hours of highest reliability risk be determined? A year, a season, a month, or some other interval? At what point in time should that determination be made?**

RESPONSE:

See Jupiter Power's responses to Questions 2 and 4. The period should be monthly at the longest, as the causes of hours of highest uncertainty, highest risk and highest net peak load vary greatly across the span of a year and even across the span of shoulder seasons. Both the determination of the interval and of the number of hours per interval should be made at least a year prior to implementation and should not change from year to year and without evaluation of first performance to provide the regulatory certainty necessary for financing.

QUESTION:

6. **Would a voluntary forward market for generation offers and a mandatory residual settlement process for Load Serving Entity procurement provide additional generation revenue sufficient to incentivize resource availability in a way that improves reliability?**

RESPONSE:

See Jupiter Power's response to Question 2. Lenders will likely view the PCM as a merchant mechanism, without the historical performance of current merchant energy and ancillary service. Further, a PCM with a higher amount of uncertainty might result in higher potential exposure and higher collateral requirements that may limit the amount of market participants and each market participants ability to participate.

QUESTION:

7. **Does a centrally cleared market through ERCOT sufficiently mitigate the risk of market power abuse? Should additional tools be considered?**

RESPONSE:

Jupiter Power has no response to Question 7 at this time.

QUESTION:

8. **If the commission adopts a market design with a multi-year implementation timeline, is there a need for a short-term "bridge" product or service, like the Backstop Reliability Service (BRS), to maintain system reliability equivalent to a 1-in-10 LOLE or another reliability standard? If so, what product or service should be considered?**

RESPONSE:

E3's report states that the pre-equilibrium LOLE for 2026 under conditions of the energy-only market is .02 or .02-in-10 LOLE. Many stakeholders, including the Independent Market Monitor to ERCOT, have raised concerns with the assumptions in generation retirement and ORDC revenues that E3 used to arrive to ultimate conclusions in the study. Therefore, we cannot opine regarding what solutions there is a need for in order to maintain short-term system reliability equivalent to a 1-in-10 LOLE.

However, to address hours of high risk and high uncertainty in a way that preserves market incomes that incent maintaining and investing in new dispatchable generation, a "bridge" product or service should be explored to replace the current conservative operations and over-procurement of RUC. As discussed in our introductory comments, we encourage full realization of SB3 regarding ancillary services, including possible expanded procurement of ECRS or regulation service and exploration of an uncertainty product for ramping. If an uncertainty product is implemented, this could allow for ancillary services to be procured on an even more competitive basis by allowing for the current duration requirements on Non-Spin and ECRS to be removed and for price-suppressing RUCs to be reduced.

Additionally, Jupiter Power appreciates that the Backstop Reliability Service proposal has been thought out to preserve and encourage effective price signaling while preserving an energy-only market, with the intention of providing investment incentives to dispatchable generation while enhancing revenue streams for generation that have already made their investments.

QUESTION:

9. **If implementing a short-term design as a "bridge" delays the ultimate solution, should it be considered? Is there an alternative to a bridge solution that could be implemented immediately, using existing products, such as a long-term commitment to buy the additional 5,630 MW of Ancillary services necessary to achieve the 1-in-10 LOLE reliability standard?**

RESPONSE:

As with the Phase I Market Design elements, Jupiter Power believes that the increase in investment for new dispatchable generation brought on by a "bridge" product should be fully realized and evaluated before another solution is implemented as the premise of the Phase I and bridge proposals have been based on principles of the energy-only market and could nullified or harmed by a conflicting market design.

QUESTION:

10. **What is the impact of the PCM on consumer costs?**

RESPONSE:

Consumer affordability should be considered. Generally, this is by making energy available at the time of consumer need to balance rewarding generator in real-time with ensuring reliability. Additionally, applying new technology that is capable of meeting consumer needs also lends to consumer affordability. Instantaneously responding batteries lead to lower costs for consumers but replacing resources with longer start times for certain services, also freeing those longer starting resources to provide the capacity they are better suited to provide at times that efficiency of their unit. At the December 5th Texas House State Affairs Committee hearing, the Independent Market Monitor has stated that the current "conservative operations" out-of-market actions have cost consumers between $800,000,000 and $1,000,000,000 from August of 2021 to July of 2022.

QUESTION:

11. What is the fastest and most efficient manner to build a "bridge" product or service, such as the BRS, in order to start sending market signals for investment in new and dispatchable generation, while a multi-year market design is implemented by ERCOT? Please provide specific steps.

RESPONSE:

Jupiter Power has no response to Question 11 at this time.

QUESTION:

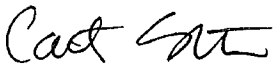
12. In what ways could the Dispatchable Energy Credit design be modified through quantity and resource eligibility requirements, e.g., new technology such as small modular nuclear reactors, in such a way that it incentivizes new and dispatchable generation?

RESPONSE:

Jupiter Power has no response to Question 12 at this time.

Jupiter Power appreciates the opportunity to provide these comments to the record ahead of the January 12, 2023, Open Meeting and the 88th Texas Legislative Session, convening on January 10, 2023, and looks forward to participating in future discussions at ERCOT, the Public Utility Commission of Texas and the Texas Legislature.

Respectfully Submitted,



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EXECUTIVE SUMMARY
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- Jupiter Power is an energy storage developer and operator in the ERCOT market with commercial operations of 427MW/655Mwh of battery energy storage projects in the ERCOT market. In July of 2022, when summer conditions required two conservation requests to the public, in total there were almost 1650MW of battery energy storage synchronized to the ERCOT grid, with a reported average real-time contribution of 947 MW to Physical Responsive Capability (PRC) during the hour of tightest reserves on July 13, 2022, the day of one of the conservation requests.
- Market design should be technology neutral. This approach produces market efficient outcomes that go towards customer affordability and is consistent with SB3's direction on ancillary services in ERCOT. If appropriate penalties for failure to provide are in place, different technologies can then do their own risk calculus for being able to provide services with certain characteristics, and still preserve overall reliability.
- The problems we should be trying to solve for in ERCOT should be forward-looking issues of operational uncertainty. Therefore, if implemented, a PCM should solve for the hours of highest risk or highest uncertainty, which result in peak net load.
- PCM might incent the same behaviors as the energy only market by incenting generators to be online during hours of highest need through financial reward, but the PCM would be at the same time suppressing energy and ancillary service prices that incent those behaviors. If a new market design suppresses those peak prices, it must account for contracted revenues, or merchant value in the performance credits in order for developers to have the regulatory certainty needed to finance new dispatchable energy projects.
- PCM would be enhanced by a monthly instead of yearly procurement. Uncertainty is different in its characteristics from month to month. Jupiter Power proposes that the risk hours be determined monthly and would support exploring a construct of two to four highest risk hours a month.
- Jupiter Power encourages full realization of SB3 regarding ancillary services, including possible expanded procurement of ECRS or regulation service and exploration of an uncertainty product for ramping. If an uncertainty product is implemented, this could allow for ancillary services to be procured on an even more competitive basis by allowing for the current duration requirements on Non-Spin and ECRS to be removed and for price-suppressing RUCs to be reduced.
- Like with the Phase I Market Design elements, Jupiter Power believes that the increase in investment for new dispatchable generation brought on by a "bridge" should be fully realized and evaluated before another solution is implemented, as the premise of the Phase I and bridge proposals have been based on principles of the energy-only market and could be made null or harmed by a conflicting market design.