

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

Order Instituting Section 206 Proceeding and)
Commencing Hearing Procedures and Establishing) Docket No. EL18-35-000
Refund Effective Date)

**COMMENTS AND RECOMMENDATIONS OF THE
SOUTHWEST POWER POOL MARKET MONITORING UNIT**

The Southwest Power Pool, Inc.'s (SPP) independent Market Monitoring Unit (MMU) respectfully submits comments in response to the Federal Energy Regulatory Commission's (Commission) December 21, 2017 Order Instituting Section 206 Proceeding and Commencing Hearing Procedures and Establishing Refund Effective Date (Order) for SPP's practices regarding the pricing of quick-start resources.¹ In this Order, the Commission finds that SPP practices regarding the pricing of quick-start resources may be unjust and unreasonable because the practices do not allow prices to reflect the marginal cost of serving load.²

The MMU agrees that the current approach to quick-start resources under the SPP's Open Access Transmission Tariff (Tariff) is problematic and requires modification. The MMU also agrees that some aspects outlined in the Order are consistent with concepts that have been worked on over the past few years by the RTO, its members and stakeholders, and the MMU.

¹ *Order Instituting Section 206 Proceeding and Commencing Hearing Procedures and Establishing Refund Effective Date*, 161 FERC ¶ 61,296 (2017).

² Order at 1.

Unfortunately, because of various circumstances these enhancements have yet to be filed with the Commission. While the goals of the Order and the RTO's developed enhancements are similar, the MMU believes that certain modifications prescribed in the Order are inappropriate and could have the potential to reduce resource flexibility rather than increase it. Furthermore, some of the proposed modifications would have unintended consequences that would also present additional challenges for MMU's monitoring duties as well as for SPP's operational activities. These challenges would need to be addressed for the Commission's vision of quick-start resource pricing to be realized.

Therefore, the MMU respectfully requests that the Commission hold the Order in abeyance while SPP and its stakeholders finalize and file their quick-start proposal. When the revised design is filed, intervenors will offer comments and concerns as to the proposal and the Commission will then be in a position to assess whether SPP's proposal will result in a just and reasonable rate or whether a further compliance filing or refile is necessary. The MMU anticipates SPP can file the quick-start proposal and that the Commission can issue an order this year. At that time, the Commission may terminate this Section 206 proceeding, avoid the need to issue an SPP-specific order, and then wait for a compliance filing.

Permitting SPP to proceed along its Section 205 path will allow stakeholders to focus on planned initiatives to address what the MMU believes to be the high priority issues going forward; namely reducing self-commitment of resources, improving and valuing actual ramping flexibility through the development of a ramping product, and tariff enhancements to encourage new storage technologies.

I. BACKGROUND

A. The NOPR on Fast-Start Pricing and the Current Order

The Order follows a set of efforts initiated by the Commission related to price formation in the energy and ancillary services markets operated by RTOs/ISOs. After presenting a set of price formation goals starting in 2014, the Commission directed each RTO/ISO to file a report on several topics associated with price formation issues, including fast-start pricing.³ SPP filed its comments⁴ by responding to questions in the Order directing reports based on SPP's design principles such that:

1. Operationally constrained resources (*e.g.*, resources subject to ramping capability or maximum/minimum operating limits) cannot set price in the SPP market, and
2. SPP's current design considers resources as quick-start resources if
 - a. They have cold start-up times of ten minutes or less, and
 - b. They have notified SPP that they are capable of following dispatch.

However, SPP noted that under a proposed quick-start design that was approved through SPP's stakeholder process, a resource would be considered "quick-start" if the following conditions were met: (i) the resource is registered as a quick-start resource, (ii) its cold start-up time is ten minutes or less, (iii) its minimum run time is one hour or less, and (iv) its total minimum down time (including ramp time) is one hour or less.

³ See Price Formation in Energy and Ancillary Services Markets Operated by Regional Transmission Organizations and Independent System Operators, 153 FERC ¶ 61,221, (2015) (Order Directing Reports).

⁴ See Report of Southwest Power Pool, Inc. on Price Formation Issues, Docket No. AD14-14-000, March 4, 2016 at PP 1-2.

The Commission subsequently issued a notice of proposed rulemaking (NOPR) in 2016 on fast-start pricing,⁵ primarily finding that:

- a. The current RTO/ISO pricing practices potentially lead to unjust and unreasonable rates, and the proposed rules will more accurately reflect the marginal cost of production in periods when a fast-start resource is the marginal resource and provide price signals; and
- b. The proposed reforms will provide more accurate and transparent price signals to better reflect the actual marginal cost of serving load and reduce uplift.

As a result, the Commission stated five proposed requirements for fast-start pricing rules and sought comments. These requirements were:

1. **Definition:** Apply fast-start pricing to any resource—regardless of technology type—committed that is able to start up within ten minutes, has a minimum run time of one hour or less, and that submits economic energy offers to the market, excluding self-scheduling energy;
2. **Inclusion of Start-up and No-load Costs in Prices:** Incorporate commitment costs (i.e., start-up and no-load costs) of fast-start resources in forming energy and operating reserve prices;
3. **Relaxation of Economic Minimum Operating Limit:** Modify fast-start pricing to relax the economic minimum operating limit of fast-start resources and treat them as dispatchable from zero to the economic maximum operating limit for the purpose of calculating prices;

⁵ See Fast-Start Pricing in Markets Operated by Regional Transmission Organizations and Independent System Operators, Notice, Docket No. RM17-3-000 (December 30, 2016), 157 FERC ¶ 61,213.

4. **Off-line fast-start resources:** Allow off-line fast-start resources to set prices so that they can better reflect the cost of providing energy at a given location or of meeting reserve requirements;
5. **Day-Ahead and Real-Time Market Consistency:** Incorporate fast-start pricing in both the day-ahead and real-time markets.

After evaluating the submitted comments, the Commission withdrew the NOPR and decided to pursue Section 206 actions on specific RTO/ISO fast-start pricing rules rather than imposing a uniform set of fast-start pricing requirements for all RTOs/ISOs.

The MMU sees the Order as a continuation of price formation efforts of the Commission and appreciates that the Commission raised important topics with regard to pricing of quick-start resources to enhance the price formation in the SPP market.

The Order institutes an investigation to examine SPP's Tariff and practices to determine whether SPP should be required to revise its Tariff to: (1) modify SPP's dispatch process to respect physical parameters of resources while minimizing production costs; (2) modify pricing logic to allow quick-start resources' commitment costs to be reflected in prices; (3) modify the definition of quick-start resources to require that they have a minimum run time of one hour or less; (4) allow all quick-start resources, including block-loaded quick-start resources, to set prices; and (5) consider all eligible resources for purposes of quick-start pricing, including unregistered quick-start resources.⁶

B. SPP's Board Approved Quick-Start Design

SPP currently has a stakeholder-approved market design for quick-start resources that has not been filed with the Commission. The MMU believes that this design will address many of the

⁶ Order at 1.

concerns that the Commission laid out in the Order. SPP delayed the filing of these tariff revisions for various reasons as explained below.

Golden Spread Electric Cooperatives (GSEC) submitted the new quick-start proposal⁷ on September 2, 2015 after developing the design with SPP staff for several months. This initiative was quickly approved by SPP stakeholders in October 2015.⁸ Because of the conflicts with SPP's multi-configuration combined cycle project, SPP estimated that the revised quick-start process would be implemented in September 2017.⁹

One reason that SPP delayed filing the quick-start tariff revisions was because of implementation conflicts with the multi-configuration combined cycle project.¹⁰ Moreover, since the multi-configuration combined cycle design was in progress before the quick-start revision was submitted, and because the multi-configuration design evolved, SPP staff submitted revisions to align the two designs.¹¹ Another delay emerged during the preparation for the implementation of the proposed quick-start design: SPP determined that the language needed clarification.¹² This clarification was approved in January 2018.¹³

The SPP proposed quick-start design (SPP Proposed Design)¹⁴ is based on real-time commitment. SPP proposed to delay commitment of quick-starts resources until the time of dispatch unless there was a reliability reason to commit it sooner. SPP's short-term commitment

⁷ RR 116 Quick-Start Real-Time Commitment ("RR 116").

⁸ RR 116 was approved by the SPP Markets and Operations Policy Committee on October 13, 2015 and by the SPP Board of Directors on October 27, 2015.

⁹ Change Working Group Minutes (December 15, 2016) available at (<https://www.spp.org/Documents/46265/December%20CWG%20Meeting%20Minutes.pdf>).

¹⁰ See Docket No. ER17-358-000 (November 16, 2016). This project was implemented on March 1, 2017.

¹¹ See also RR 137 Quick-Start Appendix G and ECC Clean-up ("RR 137") and RR142 Quick-Start Multi-Configuration Ineligibility ("RR 142").

¹² See RR 256 QSR Correction and Clean-up ("RR 256") submitted on November 14, 2017.

¹³ The SPP Markets and Operations Policy Committee approval on January 16, 2018 and the SPP Board of Directors approval on January 30, 2018.

¹⁴ The SPP design is comprised by RR 116, RR137, RR 142, and RR 256.

process¹⁵ is performed every 15 minutes and looks ahead two to three hours. This process estimates whether or not a quick-start resource will recover both its commitment costs and marginal energy costs for at least its minimum run time, the same as the standard unit commitment process used for non-quick-start resources. If both marginal and commitment costs are expected to be recovered, then this process allows the quick-start resource to be dispatched in the real-time market. If real-time energy prices exceed the energy offer curve, not including commitment costs, then the quick-start will receive a real-time commitment and a dispatch instruction.¹⁶ If real-time prices do not merit dispatching the quick-start, then it remains off-line without a commitment.

SPP's short-term commitment process uses an aggregated energy offer curve to estimate a quick-start resource's cost recovery. This aggregated energy offer curve adds start-up cost and no-load cost to the energy offer curve.¹⁷ The start-up cost is amortized over minimum run time and the quick-start resource's economic minimum operating limit. The no-load cost is amortized over the quick-start resource's economic minimum operating limit. It is important to note that the aggregated energy offer curve is used only to estimate cost recovery and is not used to set price.

In order to avoid unrecovered costs, and therefore uplift, any quick-start resource that is not estimated to recover its costs is not made available to the real-time market for dispatch, even if large price spikes occur in the real-time market. However, if costs are expected to be recovered, then the quick-start is made available for dispatch. The estimation of cost recovery does not guarantee dispatch and commitment; real-time price will dictate the final dispatch decision.

¹⁵ Short-Term Intra-Day Reliability Unit Commitment, often referred to as "STRUC."

¹⁶ Subject to co-optimization.

¹⁷ The current SPP rules for mitigated offers provides an *option* to allow the market participant to incorporate commitment costs into energy offer curve via adders (*see* SPP Integrated Marketplace Protocols (Protocols), Appendix G § 2.6). These adders are amortized over the resource's minimum run time and its average energy output during the minimum run time for the last year. However, the SPP Proposed Design automatically amortizes commitment costs over minimum run time and the economic minimum limit.

If dispatched, the quick-start resource is able to set price, according to its submitted energy offer curve, as long as it is not constrained by its minimum limit, its maximum limit, or its ramp rate.¹⁸ The prohibition against constrained resources setting price is applied to all resources regardless of type. This concept is consistent with marginal cost pricing because any seller that cannot provide the next increment or decrement of production cannot set marginal price.

The SPP Proposed Design has a commitment process for quick-start resources that is largely comparable to other resources. The real-time commitment instruction to quick-start resources includes a start-up and shut-down instruction like non-quick-start resources. As with other commitments, the shut-down time of the commitment may be adjusted by the commitment processes depending on real-time events or the projection thereof. The quick-start resource is guaranteed to be committed for at least its minimum run time, the same as non-quick-start resources. Because quick-start resources receive a commitment, they are eligible for make-whole payments, consistent with non-quick-start resources. However, if a quick-start resource fails to start up for its commitment period, then it will be subject to charges for make-whole payments. If SPP determines that it needs a quick-start resource for reliability reasons, then that quick-start resource will receive a commitment outside the quick-start process.

The SPP Proposed Design provides market participants with an option to register their resource as a quick-start resource or not. If a resource is not registered as a quick-start resource, then it will be dispatched and committed like any other resource.

A quick-start resource is able to provide regulation as long as its regulation minimum is equal to its economic minimum output and its regulation maximum is equal to its economic

¹⁸ SPP Tariff, Sixth Revised Volume No. 1, Attachment AE, § 8.3(1).

maximum output.¹⁹ Otherwise, the quick-start resource cannot provide regulation when committed and dispatched in real time.

Unfortunately, the delays in filing these quick-start enhancements have not afforded the Commission the opportunity to officially consider the SPP Proposed Design. The MMU believes that there are advantages to SPP's proposed quick-start approach in addressing the Commission's concerns as laid out in the Order. Our thoughts on the Order and the SPP Proposed Design are outlined below.

II. SPP MMU COMMENTS

The MMU shares the Commission's view that the SPP's current quick-start logic is problematic and needs to be improved. The MMU agrees with several proposed requirements in the Order. However, the MMU strenuously objects to certain elements outlined in the Order. The MMU believes that the SPP Proposed Design changes, as outlined above, address many of the conceptual problems with the current SPP design and are based on many of the same principles identified in the Order. The MMU comments below highlight where we agree with the Order and the concerns we have with the Order.

The MMU agrees with the Commission that the SPP market rules should remove the option for quick-start resources to incorporate commitment costs in the incremental energy offer curve. The MMU also agrees that the definition of quick-start resources should include a requirement that the quick-start resources have a minimum run time of one hour or less, and that the SPP's Tariff set forth its rules and practices regarding the pricing of quick-start resources.

The MMU, however, objects with the pricing approach set forth in the Order that all quick-start resources, including block-loaded quick-start resources, set prices because this would conflict

¹⁹ See RR 256.

with price formation principle being based on marginal offers as is the current approach in SPP and other RTOs/ISOs. In addition, the MMU disagrees with the Commission's assertion that SPP's screening run and the subsequent pricing and scheduling runs are based on a set of available resources that is not reflective of actual available resources. The MMU believes that SPP's current optimization logic uses the appropriate operational and reliability constraints as required by the Order by using only the physical offer parameters that are deliverable or feasible at dispatch. Further, the Order's proposal for relaxation of quick-start resources' economic minimum operating limits by up to 100 percent for setting prices will lead SPP to set prices based on availability and flexibility that do not exist. The Commission's quick-start pricing proposal would also create an efficiency issue as the pricing approach would deviate from marginal cost pricing and effectively implement an average cost pricing approach.

Moreover, the MMU would like to caution the Commission on several items including the potential impacts to the current mitigation approach and issues related to how parameters could be changed should the Commission continue forward with the approach outlined in the Order. Finally, the MMU highlights several initiatives that should have higher priority given the set of challenges SPP currently faces including integrating an increasing level of renewable generation, reducing self-commitment of generation, the need for actual resource flexibility through a ramping product and the integration of energy storage resources.

A. The MMU agrees with some of the Commission’s proposed changes

1. The optimization should evaluate commitments costs in minimizing production costs

The MMU agrees with the Order that there should be no optionality for quick-start resources to incorporate commitment costs in the commitment decision process.²⁰ The market optimization should evaluate these costs in order to minimize production costs. The current SPP rules allow commitment costs to be included in the quick-start resource’s mitigated incremental energy offers via optional amortized start-up and no load adders. Under this approach, quick-start resources can set the price through their incremental energy offers during periods when the quick-start resource is marginal.²¹

The SPP Proposed Design removes the optionality feature of the current design for including commitment costs in the commitment decision-making process. The newly proposed design considers all commitment costs of quick-start resources by looking ahead to ensure that the resource would be economic through its minimum run time. The SPP Proposed Design provides a look-ahead feature through short-term intra-day reliability unit commitment (STRUC) such that the real-time clearing prices are forecasted, and a particular resource is recommended to be included in the market solution if its commitment costs could be recovered by the forecasted price during a resource’s minimum run time. Otherwise, the unit would not be considered in the real-time solution.

In the SPP Proposed Design, the resource is dispatched based on the marginal energy costs, not on commitment costs. During the time frame between the STRUC process and the 5-minute real-time dispatch, market conditions (e.g., load or wind generation levels) may change such that

²⁰ Order at 15-16, 18, 25.

²¹ However, the current SPP Tariff does not have a registration requirement for quick-start resources, contrary to what is stated in the Order (*see Id.* at 16).

the decision to include a quick-start resource in the solution may need to be supplemented by a ramp product that accounts for uncertainty in market conditions. The MMU therefore posits that a ramping product could be developed to address this issue along with the SPP Proposed Design.²²

2. Quick start resources should have a minimum run time requirement

Currently, SPP does not have any minimum run time requirement for eligibility as a quick-start resource, as stated in the Order.²³ However, the SPP Proposed Design introduces a minimum run time requirement of one hour or less for eligibility for quick-start resources. The MMU supports addressing this item identified in the Order and agrees with the Commission's proposed requirement of a requiring a minimum run time of one hour or less.

3. The SPP Tariff should include a description of its real-time processes

The MMU agrees with the Commission that SPP's screening, pricing and dispatch runs should be described in the SPP Tariff as the current Tariff does not outline these processes.

B. The MMU disagrees with some of the Commission's proposed changes

1. Only flexible resources should be allowed to set market-clearing prices

The SPP Tariff allows only flexible resources to set market-clearing prices, consistent with the marginal offer pricing principles. Quick-start resources are often dispatched to their inflexible economic minimum or maximum operating limits which makes them ineligible to set prices. Block-loaded resources are treated the same way because these resources' economic minimum operating limit equals their economic maximum operating limit.

²² See *infra* section II. E.1.

²³ Order at 5, 20.

The MMU believes that only flexible resources that are dispatchable to serve the incremental or decremental load must be allowed to set price, which is the current SPP approach and the approach adopted by the SPP Proposed Design. Therefore, a quick-start resource must be allowed to set prices based on being able to demonstrate flexibility rather than being designated as a quick-start resource. This allows prices to be set by marginal offers.

The Order requires SPP to allow all quick-start resources, including block-loaded quick-start resources to set prices.²⁴ This would conflict with the principle that only marginal offers set price. The MMU opposes this requirement in the Order.

2. SPP's market clearing process appropriately considers physical parameters

The SPP market optimization process includes a screening run followed by a dispatch and pricing run. The screening run produces an economic solution by assuming all resources can be dispatched from zero to their maximum economic operating limits. Once a solution is obtained in this run, any resource that is dispatched below its minimum economic operating level is excluded from the next dispatch and pricing run. For a quick-start resource to be considered for the dispatch and pricing run, it must be dispatched at or above its minimum operating limit in the screening run solution.²⁵

The Commission opposes the screening run in SPP's optimization algorithm on the basis that it sets resources with certain limitations to an off-line status and subsequently conducts pricing and dispatch runs. The Order argues that the SPP's "...dispatch schedules calculated by the pricing

²⁴ Order at 1, 6, 25.

²⁵ This screening run exists to ensure that quick-start resources are not dispatched below their minimum limits. Off-line quick-start resources must be dispatched to either zero megawatts or to a value between their minimum and maximum. The current market clearing software uses linear programming to solve continuous dispatch equations. Solving for a discontinuous dispatch range would require a slower type of programming, so two linear software runs are used.

and scheduling run are based on a set of available resources that is not reflective of actual available resources”²⁶ and “(f)urthermore, this practice may result in dispatch solutions that underestimate actual energy production because it inappropriately assumes that some quick-start resources are off-line (because of the screening run) when such resources are physically incapable of turning off because of minimum run time constraints.”²⁷

The MMU believes that, in principle, SPP’s current optimization logic uses appropriate operational and reliability constraints as required by the Order²⁸ by using only the physical offer parameters that are deliverable or feasible at dispatch. The screening run of the process treats physical parameters as fully feasible between zero and the minimum levels for the purpose of evaluating *all* SPP resources in the economic solution and sets them off-line when selected below their minimum operating levels. This is because, if included in the dispatch, these resources would be unavailable. In other words, the optimization process *respects* physical parameters of resources—as stipulated in the Order²⁹—while minimizing production cost. This is in accordance with the Order’s argument that “(a)n efficient dispatch can only be reliably determined by modeling the actual system costs and *actual system constraints* [emphasis added] within a market run that minimizes production costs.”³⁰

The Order’s quick-start pricing requirement might mean that SPP would have to implement an additional pricing run to incorporate the proposed quick-start pricing rule in the optimization process. In line with SPP’s general *ex-ante* pricing methodology, SPP’s optimization process simultaneously determines schedules/dispatch and prices and the market clearing is performed

²⁶ *Id.* at 12.

²⁷ *Id.*

²⁸ *Id.* at 25.

²⁹ *Id.* at 1.

³⁰ *Id.* at 11.

based on marginal resource offer principle. The MMU views that dispatch and pricing must operate under the same principles and should not be amended to accommodate a preset objective such as the recovery of commitment costs of quick-start resources.

The Commission's proposal may likely result in SPP adding an additional pricing run. This would also extend the amount of time required for the market-clearing engine to achieve a solution. As a result, the Order is likely to put SPP under an optimization time constraint to conduct a mitigation run in real time. Thus, this would effectively necessitate relaxation of current mitigation rules. In other words, the tightened time frame in the real-time market process could make the current mitigation process less effective and hamper the current mitigation practice. Therefore, the MMU strongly urges the Commission to consider this consequence as the MMU believes that the current mitigation rules should not be impinged to facilitate quick-start pricing.³¹

3. Relaxation of economic minimum operating limits is not appropriate

The Order requires SPP to '(a)llow for relaxation of all quick-start resources' economic minimum operating limits by up to 100 percent, such that the resources are considered dispatchable from zero to their economic maximum operating limit for the purposes of setting prices."³²

The Order's proposal for relaxation of the economic minimum operating limits for pricing will require SPP to ignore the fact that if such resources are selected in the run they will be accepted as if they could deliver that selected (MW) output level. In other words, the Order asks SPP to pretend quick-start resources can operate below their minimum physical operating limits when in fact they cannot. This proposal separates pricing and dispatch components of the optimization run, which in principle must be inseparable. This would also mean that SPP would not respect

³¹ See *infra* section II.C.1 for an additional discussion on this issue.

³² Order at 25.

physical parameters of resources while minimizing production costs, contrary to what was stipulated in the Order.³³ The MMU disagrees with this element of the proposal.

The Order's proposal would further bring a question as to why other resources should not be granted the same treatment for relaxing their minimum operating limits. In fact, this argument was recently brought forward by PJM when it proposed to change the marginal price setting rule so that inflexible units will also be able to set prices.³⁴ PJM argues that inflexible resources—mostly coal and nuclear—are needed in the marketplace but, under the current marginal price setting rule, cannot recover their costs. The current PJM market rules—as with other markets including SPP—allow only flexible units to set clearing prices. PJM argues that when a supply is in a range of load that can be met by inflexible units the price-setting rule dictates the next available technology in the merit order, which is often renewable resources that offer at zero marginal cost. This causes low locational marginal prices as well as uplift for inflexible units. PJM proposes to allow all resources selected for dispatch—both flexible and inflexible units—to set price. This method, PJM argues, would provide appropriate incentives to support an increasingly efficient commitment and dispatch solution and would reduce uplift.³⁵

The SPP MMU strongly opposes the Order's proposal. The marginal price setting rule is established upon a principle that a single (simultaneous) dispatch and pricing run is employed to achieve optimal dispatch and pricing solutions. Any non-convexities in the optimization process can be dealt with through uplift payments. When such non-convexities are attempted to be

³³ *Id.* at 1.

³⁴ Proposed Enhancements to Energy Price Formation, PJM Interconnection, November 15, 2017.

³⁵ The proposed method would decompose the optimal (single) dispatch and the pricing run into two separate runs: One for the dispatch run, which includes non-convexities for optimal solution as in the standard LMP model, and the other for the pricing run, which applies convex relaxation to the SCED dispatch run, called the “extended LMP method.” It is implemented through integer relaxation of commitment constraints from binary values to continuous values in the pricing run. *See Id.*, PP 11-15.

addressed via integer relaxation, as is the case with the PJM proposal, the basic principle of the optimization problem is undermined to create a pricing solution that would represent a distortion to the solution. A standard LMP optimization is a first-best approximation to addressing non-convexities to the extent uplift is minimal relative to the total market volume of transactions, which is usually the case for most markets. In the integer relaxation approach, the fundamental principal of pricing is violated through conducting a pricing run by changing the non-convex character of some of the constraints which results in distorted prices.

The California ISO Department of Market Monitoring (“CAISO DMM”) also opposes inflexible resources to set prices for similar reasons.³⁶ CAISO DMM argues that when discrete or lumpy costs—such as the commitment costs—are present at the minimum operating level the average cost would be declining with increased output and the generator’s marginal cost would stay below its average cost. In this case, the marginal cost pricing would not lead to recovery of total costs in that interval. The optimal solution then is a two-part pricing scheme where marginal energy offers are used to set prices and the unrecovered portion of commitment costs are compensated through make whole payments. The CAISO DMM asserts that “(i)n PJM’s proposed pricing run, the costs are “relaxed” so non-convexities are “made” convex. Rather than using the actual cost structure, this method sets prices based on cost structures that do not actually exist.”³⁷

In fact, the two-part pricing method is widely accepted as an efficient pricing method in the economics literature and industry practice when discrete costs are present. The multi-part

³⁶ Comments of the Department of Market Monitoring for the California Independent System Operator Corporation to NOPR; Reply Comments of the Department of Market Monitoring for the California Independent System Operator Corporation to Grid Resiliency Pricing Rule, 82 Fed. Reg. 46,940 (Oct. 10, 2017) (CAISO DMM Reply Comments).

³⁷ *Id.*, CAISO DMM Reply Comments at P 5.

pricing is used also in retail electricity utility ratemaking as an efficient pricing method when some cost elements of the service do not vary with the amount served.

Should the Order's commitment cost treatment and an associated pricing run be implemented, dispatching a quick-start resource below its operating minimum cannot possibly reflect its marginal cost and would likely result in average cost pricing. Furthermore, ignoring actual physical parameters in the optimization process would create inefficiencies by rewarding inflexible resources for fictional flexibility.

Most quick-start resources in the SPP market are flexible between their minimum and maximum operating limits. Furthermore, the SPP market has very few block-loaded resources—only two resources³⁸—that would have de minimis potential impact on the market. However, the Order's requirement would create incentives for resources to provide less *actual* flexibility to the market, which could potentially increase the number of block loaded resources. For instance, under the current design, there were several peaking resources combined together into one larger resource. However, the market participant determined it would be more economic to break the resource into smaller pieces to address concerns that the full resource output was not always needed. Under the Order, these resources would likely recombine to create the larger resource that would set a favorable price for the combined resource, even though the full output may still not be needed. Finally, when a quick-start resource's economic minimum operating limit is relaxed, another resource must be backed down since the quick-start resource will be producing more. This would amount to increasing the production cost, as the backed down resource will be paid as if it

³⁸ Out of more than 700 registered units at the SPP market. As of February 2018, the two resources registered with economic minimum limits equal to economic maximum limits have a total capacity of 6.2 MW.

were producing the original amount. In other words, such an implementation would also be in conflict with the production cost minimization objective of the Order.³⁹

C. The Order would have unintended consequences on mitigation and the setting of parameters

While the MMU fully supports the Commission's goals of proper price formation⁴⁰ and its direction to minimize production cost while respecting parameters,⁴¹ we have concerns regarding unintended consequences and we believe that some items require further clarification. If SPP moves forward in the direction of the Order, the following issues should be addressed.

1. The Order could reduce the effectiveness of mitigation

The MMU is concerned that if additional solve time is needed to accomplish the recommendations from the Order, then real-time mitigation process could be affected and, thus, not appropriately address mitigation of local market power. Currently, the SPP optimization process sets schedules/dispatches and prices in the same market run. The Order implies that pricing and scheduling/dispatch should occur in separate runs. SPP staff voiced concern in the November 2017 Market Working Group meeting that in order to add more features to the optimization, changes would need to be made to the process. Specifically, SPP staff noted that the current mitigation process is consuming a significant portion of the market clearing engine's processing power and solve time. In order to keep the solve-time acceptable for 5-minute dispatch, SPP staff discussed removing the real-time mitigation process from the optimization in order to use the processing resources to allow for additional enhancements. The SPP staff indicated that the mitigation process could be moved to a separate parallel process that would feed into the

³⁹ Order at 6.

⁴⁰ Order Directing Reports at 2.

⁴¹ Order at 1.

optimization. The MMU would find the removal of real-time mitigation to a parallel process unacceptable.

Although look-ahead mitigation has been discussed, and in some cases implemented, it can inaccurately mitigate offers and result in erroneous pricing and uplift. California ISO, for instance, uses a look-ahead mitigation approach. This look-ahead process was accurate in just over half of 5-minute intervals in 2015 and 2016.⁴² All look-ahead processes are inherently inaccurate since changes are constantly occurring in real time. The unexpected market activity between the look-ahead and real time will inevitably result in over- or under-mitigation. Because the wrong offers will at times be used, prices can be improperly formed, resulting in either production costs that are not minimized or not allowing a generator to recover its actual cost. By either over- or under-mitigating, the look-ahead mitigation approach does not “provide transparency so that market participants understand how prices reflect the actual marginal cost of serving load.”⁴³

The addition of a pricing run cannot come at the cost of proper mitigation. Any solution must keep real-time mitigation intact. Weakening the current mitigation process will only move a market inefficiency rather than reduce overall inefficiency.

2. Participants could circumvent the requirement to offer in as a quick-start resource by adjusting parameters

If a generator is capable of providing energy as a quick-start resource, then that capability should not be withheld from the market via registration; however, market participants could sidestep this entire requirement with a simple parameter change. While some RTO/ISO tariffs clearly mandate accurate and physical characteristic-based parameters,⁴⁴ SPP’s tariff does not

⁴² See 2016 CASIO Annual Report on Market Issues & Performance, Section 7.2, Table 7.6 and 2015 CASIO Annual Report on Market Issues & Performance, Section 7.3, Table 7.5.

⁴³ Order Directing Reports at 2.

⁴⁴ Such as CAISO’s Fifth Replacement FERC Electric Tariff Section 4.6.4.

clearly require non-dollar parameters to represent accurate, physical, verifiable limitations. For instance, the California ISO tariff unambiguously states that all parameters “shall be accurate and actually based on physical characteristics of the resources.”⁴⁵ Without such a clear requirement, market participants can easily evade the Commission’s quick-start pricing process by modifying parameters, resulting in unjust and unreasonable rates.

i. Start-up and minimum run times could be adjusted to either qualify or disqualify a resource from quick-start status

Market participants can easily modify a resource’s start-up time and/or minimum run time to avoid the quick-start pricing mechanism regardless of any registration status.^{46,47} The fast-start NOPR proposed defining quick-start resources by a start-up time of ten minutes or less and a minimum run time of one hour or less.⁴⁸ We are concerned that unless the tariff strictly holds parameters to accurate and physical limitations, then market participants may increase start-up times outside of the quick-start range. For instance, a market participant could change a resource’s 10-minute start-up time to 11-minutes in order to disqualify the resource from the quick-start logic. This could result in suboptimal solutions and energy being withheld. Likewise, market participants may decrease start-up times just below the threshold resulting in suboptimal solutions and inaccurate pricing. For example, a market participant could change a resource’s 15-minute start-up time to 10-minutes in order to qualify the resource for the quick-start logic.

Similarly, market participants may increase or decrease minimum run times outside or inside of the quick-start range. For example, market participant could increase a resource’s 60-minute minimum run time to 61 minutes in order to disqualify the resource from the quick start

⁴⁵ *Id.*

⁴⁶ See Protocols version 54, § 4.2.2.1(22), (31).

⁴⁷ This may also affect amortization of commitment costs as discussed *infra* II.D.3, 5.

⁴⁸ NOPR at 44.

logic. Similarly, a market participant could change a resource's 70-minute minimum run time to 60 minutes in order to qualify the resource for quick-start logic. This would result in uneconomic energy being injected into the market since the resource would have been dispatched down if not for its adjusted run time. Manipulating run time would undermine transparency and may reduce total surplus.⁴⁹

Currently, start-up time can be changed hourly and minimum run time can be changed daily without any reason or verification required, as long as it is within certain bounds.⁵⁰ Start-up time could be leveraged to opt a resource in and out of quick-start status on an hourly basis.

In order to implement this requirement, some sections of the SPP Tariff would need to be modified. This may be accomplished by modifying SPP Tariff Attachment AE, Section 4.1 to include a statement such as, "All non-dollar-based parameters shall be accurate, verifiable, and based on physical and/or environmental limitations."⁵¹ Other sections may be affected such as SPP Tariff Attachment AF, Section 3.6 because it discusses thresholds for parameter changes. SPP should also consider clearly stating that all information that a market participant, or its representative, communicates to the Transmission Provider be true, accurate, and verifiable.

ii. Control status can be modified to qualify or disqualify a resource from quick-start status

Additionally, we are concerned that market participants could qualify or disqualify a resource as a quick-start resource by manipulating its control status.⁵² Control Status indicates a resource's ability to follow a setpoint instruction. A market participant could submit a

⁴⁹ Order Directing Reports at 2.

⁵⁰ See the thresholds described in SPP Tariff, Sixth Revised Volume No. 1, Attachment AE, § 3.6.

⁵¹ Non-dollar-based parameters should include economic minimum and maximum limits among other parameters.

⁵² Protocols § 4.4.2.2.3.

commitment status⁵³ reflecting economic availability while making the generator actually unavailable by submitting manual or off-line control status. If a manual control status were submitted when the quick-start was producing zero megawatts, then it will continue to be dispatched to zero megawatts. If an off-line control status were submitted, then the quick-start would not be committed or dispatched. Both of these scenarios could effectively allow quick-starts to opt out of quick-start pricing and can be changed at any time. The SPP Protocols sets limitations on a manual control status;⁵⁴ however, the tariff does not have a similar section describing control status. The language describing control status would also need to be solidified to avoid manipulation. SPP's tariff does not elaborate on the term control status, so language for this would need to be modified.

D. Several items in the Order require further clarification

1. The quick-start design needs to address the treatment of off-line resources

The revised quick-start design needs to clearly address how price is set when a quick-start remains off-line after setting price. Since SPP uses ex-ante pricing, the market clearing engine assumes that generators will follow dispatch. If the price is affected by the quick-start not starting, then ex-post pricing⁵⁵ is required. Ex-post pricing would require a major overhaul of the market clearing software and possibly hardware. The revised quick-start design should clearly define if the intent of the Order is to impose ex post pricing and how it is to be used.

2. Quick-start resources should not set price if the dispatch is zero megawatts

⁵³ See SPPTariff, Sixth Revised Volume No. 1, Attachment AE, § 4.1(10) and Protocols § 4.2.2.2.1.

⁵⁴ Protocols § 4.4.2.2.3.

⁵⁵ "Ex-post" pricing is defined here as calculating price after physical, real-time operations have occurred.

The revised quick-start design should clearly explain how prices are set when a quick-start resource is on-line due solely to its minimum run time. Consider the following scenario: suppose, a quick-start has a minimum run time of one hour and is dispatched and setting price. During the hour wind-powered production drastically increases such that the quick-start resource would be dispatched below its minimum output, or even to zero megawatts, if not for its minimum run time. In this scenario, does the quick-start continue to set price after its output is not needed in the market? We do not believe the quick-start should set price in this scenario because allowing an unneeded resources to set price reduces transparency and may reduce total surplus. Non-quick-start generators are not allowed to set price when they are a must-run due to minimum run time. The MMU does not believe that it would be appropriate to allow quick-start resources to set price during periods when the entirety of the resource is not needed even if it is within its minimum run time.

3. The Commission should clarify how costs are to be amortized as the minimum run time approaches zero

The revised quick-start design should clearly explain how start-up cost is amortized over minimum run time as the minimum run time approaches zero minutes. As technology improves and minimum run time is reduced, the amortized start-up cost will increase the dollars per megawatt-hour offer. A sub-hour minimum run time will act as a multiplier for the energy offer.⁵⁶ Though this effect may be tempered by a reduced start-up cost as technology improves, that is not guaranteed. Even if the start-up cost is very low, or even zero dollars, how will the offer be calculated if a quick-start, possibly a stored energy generator, submits a minimum run time of zero minutes? Should there be a minimum limitation on minimum run time? If so, this may produce

⁵⁶ See *supra* section II.D.3. This parameter is not currently required to represent a physical limitation and can be easily modified.

sub-optimal market solutions when the generator capability is held back, thus reducing total surplus.

4. Amortization of the commitment costs should be removed after the minimum run time is met

The revised design should also clarify that after the minimum run time is complete, the amortization of the start-up cost should be removed from the aggregated offer curve. Otherwise, the energy price will be artificially elevated and the generator may over-recover its costs. Allowing commitment costs to continue to elevate price will inappropriately pay the generator after its cost is recovered.

5. Start-up and no-load costs should be amortized over the economic maximum

While the Order indicates that start-up and no load costs will be included in the incremental energy offer, the Order was not clear on how these will be converted into megawatt hours.⁵⁷ We believe amortizing start-up and no-load costs over a generator's economic maximum limit is the most appropriate approach. Because start-up and no-load costs do not have units of dollars per megawatt-hour like the energy offer curve to which they are being added, these costs must be amortized over some megawatt value. No single megawatt value will result in the optimal price all the time.

If the costs are amortized over a generator's economic minimum, then the energy offer curve will be artificially high since the generator will very likely be dispatched above its minimum operating level. In this case, the cost per megawatt-hour will be over-valued.

⁵⁷ Order at 25.

If the cost is amortized over a dispatch value between the economic minimum and maximum, then it is unclear which value should be used. Because dispatch and pricing are dynamically determined within the model, even in the pricing run, then the amortized cost, and therefore the offer curve, cannot be based on dispatch.

If the cost is amortized over an average dispatch value, then it would not result in optimal pricing at that time. This deviates from the marginal cost pricing concept. By the nature of an average, this approach would often result in inaccurate price signals.

As such, we prefer amortizing commitment costs over the economic maximum. If the cost is amortized over a generator's economic maximum, then the energy offer curve may be too low if the generator does not maintain output at its maximum for the entire interval even if it is because of ramp. However, in this case the eligibility for a make-whole payment is warranted and is a possibility.

6. SPP's Tariff should have an unequivocal declaration that resources must follow dispatch, commitment, and setpoint instructions

The revised quick-start design should include an unequivocal expectation to follow dispatch. The Commission acknowledged that its changes could create an incentive for a generator to chase price and therefore ignore its dispatch instruction and over-generate.⁵⁸ The Order encouraged SPP to develop a mechanism that would discourage this behavior.⁵⁹ Although SPP's tariff currently has conditional language that states that market participants are expected to follow dispatch instructions, it is unclear what the specific conditions are since the statement references the entire Attachment AE.⁶⁰ We believe that SPP's Tariff needs an unequivocal declaration that

⁵⁸ 161 FERC ¶ 61,296 at P 26.

⁵⁹ *Id.*

⁶⁰ SPP Tariff, Sixth Revised Volume No. 1, Attachment AE, § 2.4.

market participants are expected to reasonably follow dispatch, commitment, and setpoint instructions.

This expectation should go beyond penalties such as uninstructed resource deviation. Without such declaration the decision to follow dispatch can be merely a calculation of expected cost. If the RTO cannot reasonably expect market participants to follow instructions, without resorting to directives, then optimal market outcomes will not be achieved and pricing will not be transparent. Furthermore, this unambiguous expectation will support the Commission's goal of correct incentives for market participants.⁶¹

E. Current market development priorities address pressing market concerns

The RTO, its members and stakeholders, and the MMU have been in discussions as part of SPP's stakeholder process⁶² to lay out a roadmap of future market design initiatives that the MMU believes should take priority over any new quick-start resource proposal. As previously mentioned, modifications to the current quick-start design have already been through the design process and could be implemented in a reasonable timeframe. However, the SPP market faces challenges, including reducing the incidence of self-commitment of generation and valuing actual resource flexibility, integrating increasing levels of renewable generation. Any new quick-start

⁶¹ Order Directing Reports at 2.

⁶² See Market Design Initiative List Market Working Group Minutes (December 2017) available at (<https://www.spp.org/documents/56228/mwg%20minutes%2020171211%2012.pd.pdf>) and (January 2018) available at (<https://www.spp.org/documents/56334/mwg%20minutes%20&%20attachments%2020180108%2009.pdf>).

resource proposal would have to go back through the design process and would likely crowd out other priority initiatives.

The RTO, its members and stakeholders, and the MMU have developed a list of market design initiatives that address the pressing issues in the SPP markets. These initiatives include a ramping product to value actual resource flexibility, decommit logic that enhances real-time price formation, multi-day unit commitment logic to better evaluate long run time resources and reduce the need for self-committing, and a stored energy design to allow for entry of a new resources that could provide substantial amounts of flexibility.

1. A ramping product would address the need to incentivize actual dispatchable ramp

Because SPP's renewable capacity is growing exponentially, the market needs tangible, dispatchable generation flexibility. SPP currently has over 17 GW of wind capacity with wind penetration levels that have peaked at just over 56 percent of load. Furthermore, over 50 GW of wind capacity and about 17 GW of solar capacity are in the generation interconnection queue to be added by 2021.⁶³ Because of the variable output nature of these renewable energy resources, the market needs increasing capability to respond to the inevitable fluctuations in order to promote efficient market outcomes and ensure reliability. At this juncture, it is imperative for the RTO and its members to develop a mechanism for pricing and delivering tangible, dispatchable ramp.

A ramping product that incents actual, deliverable flexibility has been discussed in the stakeholder community for the last several years. This initiative has now risen to the top of the list to begin the design process. Prices based on infeasible dispatch instructions actually dis-incent flexibility. Incentivizing inflexible resources does not address the current and coming needs of

⁶³ As of February 2018, available at (https://studies.spp.org/SPPGeneration/GI_ActiveRequests.cfm).

the market. It also contradicts the RTO's priorities and reduces the benefits of a ramping product. At this time, requiring SPP to base price on an undeliverable dispatch range will disrupt the momentum of valuing deliverable ramp through the market.

Consider the following scenario illustrating the need for a ramping product. Presently, the dispatch engine solves for only the current interval and has no look-ahead logic to ensure the resource can meet the needs of future intervals. This can cause quick-ramping resources to be dispatched to their maximum limits in one interval, and then, in the next interval, there is a shortage of ramp because the only resources able to move have slower ramp rates. In these cases, the RTO has plenty of capacity on-line, but not enough rampable capacity, resulting in scarcity pricing that does not reflect the capability of the supply. The present dispatch engine values mere capacity and not deliverable, rampable capacity.

The RTO's scarcity events are very short-term, transient events that are a result of a shortage of rampable capacity. A ramping product will compensate resources for holding back capability in one interval so it can be used as energy in a future interval. This will reduce the frequency of scarcity events and provide value to those resources providing requisite ramping capability. A ramping product design has been successfully implemented in other RTOs such as the California ISO and MISO. An SPP design would likely follow their lead.

2. Changes to the decommit logic would help address concerns with price suppression

An over-commitment of resources in real time will suppress prices and lead to increased make-whole payments. This can be caused by changing conditions between the time a resource is locked into a commitment from the clearing engine and the time the resource actually comes on-line. Another stakeholder prioritized initiative is the ability to decommit a resource that was planned to be started but is no longer needed once it is actually time to start.

Frequently, resources are committed by the clearing engine well in advance of when they are actually supposed to start. This commitment is based on the known assumptions at the time the clearing engine solves. However, conditions change over time. For instance, assumptions change, load forecasts change, wind forecasts change, resources trip off-line, and outages change. Resources are committed because the clearing engine saw it to be profitable over that study period. When assumptions change, the resource may no longer be profitable but is still on the hook to be physically started. This initiative will seek to address this inconsistency.

3. A multi-day unit commitment process would reduce the incidence of self-commitment of resources

Long lead time and long run time resources are often self-committed in the market and are depressing prices in the SPP market. These resources are not able to be appropriately evaluated in the current structure of the market and can be committed by the market participant during uneconomic periods. The current clearing engine logic does not evaluate commitments beyond the 24-hour period of the next operating day. The creation of a clearing engine that evaluates resources further out into the future will allow for more efficient market solutions, as well as decreased production costs. In the current design, a resource that is required to run for multiple days is not effectively evaluated to see if the resource is economic over its minimum run time. The clearing engine may see that it is economic on the first day and issue the commitment, and then future days the resource must stay on even if it is uneconomic. This can lead to increased make-whole payments, increased production costs, and suppressed real-time prices. In addition, resources with high start-up costs are only evaluated for the first 24-hours. This makes many of them unprofitable because they are not able to recoup their high costs within the 24-hour window. Utilizing multi-day unit commitment logic, these types of resources could spread the high start-up costs over a longer period, allowing the clearing engine to see their true costs. Many of the

resources that fall into these categories self-commit in the market today, which removes the ability for SPP to commit the resources economically. Adding this multi-day unit commitment logic is on the RTO's market design initiative list, and we agree that this should be a priority item.

4. Revising market rules to encourage stored energy would help address issues related to flexibility and negative prices

The SPP market has seen an increase in wind penetration along with increased congestion, creating a need for resource flexibility and storage during increasing periods of negative prices. Stored energy resources have the potential to address these issues, but the current tariff does not easily allow these resources to integrate in our market. Stored energy resources have the potential to greatly enhance the current markets by addressing the issues related to flexibility and negative prices. In order to capture the benefits of these new technologies, a new market design needs to be developed.

The RTO, its members and stakeholders, and the MMU have discussed ways to incorporate stored energy resources in the past, but the market design has not been a priority. This is partly because of the lack of stored energy resources in the market. We believe that the lack of an effective market design may be an influencing factor limiting the integration of these resources in the SPP market. The potential design will be heavily incorporated into the regulation design. SPP commitments and dispatches both regulation and energy at the same time in a co-optimized fashion. The way that regulation is so integrated with energy means that much thought and effort will need to be put into the stored energy design. We believe that adding this new feature will allow these new resources to enter the market.

III. SUMMARY OF CLARIFICATIONS

In the case that the Commission proceeds with the Section 206 proposal, the MMU respectfully requests the Commission consider clarifying the following quick-start pricing and related items noted above. The MMU believes that this way, any forthcoming rules could be more effectively implemented.

- Require that modifications that increase optimization run time not compromise real-time mitigation.
- Require non-dollar-based parameters to be accurate, verifiable, and representative of actual physical or environmental limitations.
- Require tariff language prohibiting market participants from qualifying or disqualifying a resource as a quick-start resource by manipulating its control status.
- Clearly define when and how ex-post pricing is used, if applied at all.
- Clearly explain how prices are set when a quick-start resource is on-line due solely to its minimum run time.
- Clearly explain how start-up cost is amortized over minimum run time as the minimum run time approaches zero minutes.
- Clarify that after the minimum run time is complete, the amortization of the start-up cost should be removed from the aggregated offer curve.
- Clearly explain how start-up and no-load is converted to megawatt-hours in order to be added to the incremental energy offer.
- Require tariff language to unequivocally declare that market participants must reasonably follow dispatch, commitment and setpoint instructions.

IV. CONCLUSION

The MMU respectfully requests that the Commission hold this Section 206 proceeding in abeyance and allow the SPP RTO to file through the Section 205 process the various modifications to quick-start logic that have passed through the SPP stakeholder process. Moreover, we agree that in this process, SPP should also be required to include descriptions of its real-time processes, including the screening process, in the appropriate tariff and protocol sections.

Overall, the MMU believes that RTO's solution addresses the same broad set of goals outlined in the Order, preserves the integrity of marginal pricing, avoids unintended consequences, would be quicker to implement, and allows the RTO and its stakeholders to focus on other high priority matters including addressing issues with self-committing and the need to compensate actual flexibility to meet ramping needs.

Should the Commission continue along with this Section 206 process, the MMU strongly recommends that the Commission consider the potential implications that this proposal has on SPP's current mitigation process, and the likelihood that the mitigation process will be modified and its effectiveness potentially degraded to increase optimization time. Furthermore, we strongly recommend that the Commission address the issues with how market participants can easily change parameters. As noted above, market participants could very easily modify parameters to avoid qualifying as quick-start resource as a result of the current flexibility afforded to them under the current SPP Tariff or to inappropriately take advantage of the quick-start pricing rules. We also request further clarification on several pricing related matters as there are several items that we identified that are unclear and could have significant implications on how SPP would implement the Order.

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon the parties designated on the official service list for the above-captioned docket in accordance with the requirements of Rule 2010 of the Commission's Rules of Practice and Procedure.

Dated at Little Rock, Arkansas on this 12th day of February, 2018.