UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

New York Independent System Operator, Inc.	**)** **)**	**Docket No. EL18-33-000**

COMMENTS OF THE DEPARTMENT OF MARKET MONITORING FOR THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION

The Department of Market Monitoring (DMM) for the California Independent System Operator (CAISO) submits this errata to correct the caption in the previously submitted comments. The caption above is the correct caption.

The Department of Market Monitoring (DMM) for the California Independent System Operator (CAISO) files comments in the above-captioned proceeding. DMM submitted comments in the Federal Energy Regulatory Commission (Commission) proceedings on the fast-start pricing notice of proposed rulemaking.[1] In those comments DMM argued that locational marginal pricing would be undermined if ISOs were required to allow commitment costs to set prices. DMM is submitting comments in this NYISO proceeding because DMM believes that the fundamental principles of locational marginal pricing should be maintained as a core aspect of electricity market design nationwide.

In this Order the Commission seeks to investigate whether the NYISO's current pricing is just and reasonable. Among other things, the Commission

[1] Comments of the Department of Market Monitoring for the California Independent System Operator in RM17-3-000: http://www.caiso.com/Documents/Feb28_2017_DMMComments-Fast-StartPricingNOPR_RM17-3.pdf

seeks to determine if relaxing minimum operating limits and including commitment costs for some resources should be required for determining per unit power prices.[2]

ISO/RTO spot markets use marginal cost unit prices that reflect the marginal tradeoffs in the market. When costs are non-convex, make-whole payments are necessary. The combination of marginal cost unit prices and make-whole payments is an application of efficient multi-part pricing. Efficient multi-part pricing follows directly from core economic price theory principles of market surplus maximization and incentive compatibility.

Including commitment costs in the determination of per unit power prices will result in prices that do not reflect the marginal tradeoffs in the market and are not derived from principles of market surplus maximization and incentive compatibility. To overturn efficient multi-part pricing in favor of a pricing scheme that does not follow from principles of surplus maximization and incentive compatibility would be inconsistent with the economic justification for using locational marginal prices in ISO/RTO markets.

Marginal cost prices are derived from maximizing total market surplus

Core price theory shows that marginal cost prices are the efficient unit prices that support trades that maximize total producer and consumer surplus. The logic behind market surplus maximization is straightforward. If the benefits

[2] EL18-34 *Order Instituting Section 206 Proceeding and Commencing Paper Hearing Procedures and Establishing Refund Effective Date* pp.1-2

of production outweigh the costs then producing increases market surplus.[3] This logic not only applies to the overall benefits and costs, but also the benefits and costs at the margin. If the marginal benefits of increasing production outweigh the marginal costs, increasing production creates more market surplus. An outcome where no other pattern of production or consumption results in more market surplus is an efficient outcome.

A marginal cost unit price gives both producers and consumers the incentive to trade at the efficient level that maximizes market surplus on the margin. A marginal cost unit price is the only price needed to support the efficient outcome when marginal costs are equal to or greater than average costs, i.e. the total cost function is convex at the efficient level of production.

A locational marginal price (LMP) market minimizes bid costs (maximizes market surplus) given power balance, transmission and other constraints. The LMP is the derivative of the cost minimization lagrangian with respect to power injections at a location, i.e. the change in the total cost from a marginal change in injections at a location.

At the LMP, a producer or consumer's individual marginal tradeoffs will be consistent with the market's marginal tradeoffs. Producers and consumers will have the incentive to follow the optimal dispatch issued by the market. The LMP is the market price because it represents the marginal tradeoffs in the market and is incentive compatible with the efficient dispatch that maximizes market surplus.

[3] In these comments the term "cost" refers to opportunity cost.

Appropriateness of marginal cost pricing does not depend on convex costs

The appropriateness of marginal cost unit prices does not rely on convex costs at the efficient level of production. When costs are non-convex, and average cost decreases as output increases, marginal costs will be below average costs. A marginal cost price would pay a producer less per unit of output than their cost per unit—and the producer would lose money. Paying *only* the marginal cost price per unit would be inefficient because the producer would *choose* not to provide any output even though consumers value the total output more than the total costs of production.

However, falling average costs do not lead to the conclusion that per unit prices should not equal marginal costs. The well-known solution to pricing when average costs are decreasing is multi-part pricing. Here we use a restatement of Ronald Coase's example of two-part prices to explain how multi-part prices are derived from core economic price theory.[4]

The first part of the price is a per unit price equal to marginal cost. A marginal cost price still represents the marginal tradeoffs. To not use a marginal cost price would mean producers and consumers would face choices on the margin inconsistent with the actual tradeoffs.

[4] Coase, Ronald H. "The Marginal Cost Controversy" *Economica* 1946. The "controversy" was not over whether to use marginal cost unit prices, but how to fund the second part. Hotelling and others favored a general tax to fund the second part (they appeared to consider only the case of a purely public good). Coase pointed out that charging the actual consumers was needed to ensure total costs outweighed total benefits.

The second part is a fixed charge to consumers to offset the producer's losses. The combination of the fixed charge and the marginal cost price per unit gives producers the incentive to both engage in production and produce at the efficient level. The two part price also gives consumers the incentive to consume at the efficient level.

Under the efficient multi-part pricing scheme, production will only occur if the total benefits outweigh the total costs, and production and consumption will occur at the efficient levels at the margin. Thus, the two-part price follows directly from the surplus maximization and incentive compatibility principles of core price theory. The use of marginal cost prices and make-whole payments, paid for by energy consumers, in ISO/RTO markets is simply an application of efficient multi-part pricing.

Integer relaxation based prices are not derived from maximizing market surplus

Several proposals put forward potential alternatives to marginal cost pricing.[5] These proposals generally rely on creating separate scheduling and pricing runs and relaxing integer constraints. Market schedules would be set based on the bid costs and actual capabilities of suppliers in the market. Prices would be determined in a separate optimization run where the actual capabilities of resources are "relaxed" and fixed costs are incorporated into variable costs so

[5] Including the Fast-Start Pricing NOPR RM17-3 and PJM *Energy Price Formation and Valuing Flexibility* June 15, 2017: https://www.pjm.com/~/media/library/reports-notices/special-reports/20170615-energy-market-price-formation.ashx

that they appear to change with marginal changes in output. In other words, prices are set based on costs of production and tradeoffs that do not actually exist.

The prices generated under proposals to include commitment costs in the determination of per unit power prices would not represent the actual marginal tradeoffs in the market. Although the price decomposition looks similar to an LMP, utilizing shadow prices from similar constraints, these shadow values *do not represent the change in actual costs*. The prices faced by producers and consumers would not match the actual market tradeoffs. The prices would not give producers and consumers the incentive to follow the efficient dispatch.

Deviation penalties and payments to not deviate from the scheduling run dispatch do not restore incentive compatibility because producers and consumers would have an incentive to submit bids that do not represent their true costs and valuations.[6] The proposed pricing mechanisms seem to assume that the scheduling run can be used to find the surplus maximizing dispatch, and then the pricing run can set whatever prices it wants without affecting the efficient dispatch. But economic theory tells us that if you change the rules and incentives people will change their behavior. In this case people will change their

[6] DMM explains this point in further detail in two previous sets of comments:
Comments of the Department of Market Monitoring for the California Independent System Operator Corporation RM17-3 pp 14-15: http://www.caiso.com/Documents/Feb28_2017_DMMComments-Fast-StartPricingNOPR_RM17-3.pdf
Reply Comments of the Department of Market Monitoring for the California Independent System Operator Corporation RM18-1 pp.7-10:
http://www.caiso.com/Documents/Nov7_2017_DMMReplyComments-GridReliability_ResiliencyPricingNOPR_RM18-1.pdf

bids to not represent their true costs and valuations. Without knowing the true costs and valuations the scheduling run cannot maximize market surplus. Thus the proposed pricing creates incentives contrary to supporting the market surplus maximizing dispatch.

Proposals that would include commitment costs in the determination of per unit power prices do not follow from the surplus maximization and incentive compatibility principles of core price theory. To overturn efficient multi-part pricing in favor of a pricing scheme that does not follow from principles of surplus maximization and incentive compatibility would be inconsistent with the economic justification for using market prices in ISO/RTO markets.

Respectfully submitted,

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Independent Market Monitor for the California Independent System Operator

Dated: February 9, 2018

CERTIFICATE OF SERVICE

I hereby certify that I have served the foregoing document upon the parties listed on the official service lists in the above-referenced proceedings, in accordance with the requirements of Rule 2010 of the Commission's Rules of Practice and Procedure (18 C.F.R. § 385.2010).

Dated at Folsom, California this 9th day of February, 2018.

/s/ Anna Pascuzzo

Anna Pascuzzo