

ISO/RTO PERFORMANCE METRICS

**Commission Staff Report
AD10-5-000**



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Federal Energy Regulatory Commission Staff Report on ISO/RTO Performance Metrics

Consistent with the recommendations of the report issued by the Government Accountability Office, *FERC Could Take Additional Steps to Analyze Regional Transmission Organizations' Benefits and Performance*,¹ and the Federal Energy Regulatory Commission's (Commission) FY2010-2014 Strategic Plan, Commission Staff has worked with Independent System Operators (ISO), Regional Transmission Organizations (RTO), stakeholders and other experts to develop standardized measures or metrics designed to track the performance of ISO/RTO operations and markets. The Chairman plans to use the metrics developed by Commission Staff to submit a report to Congress that will explain what the measures and reported performance metrics communicate about the benefits of ISOs/RTOs and, where appropriate, to identify changes that may need to be made to address any performance concerns.

The purpose of this Commission Staff Paper is to describe the performance metrics that have been developed to track the performance of RTO/ISO operations and markets and to outline the process that will be taken to complete the report. Commission Staff appreciates the public comments that have been provided and is taking them into account in developing the final list of metrics to be used in tracking the performance of ISO/RTO operations and markets.

I. Background

Responding to a request for an investigation into ISO/RTO costs, structure, processes and operations,² the Government Accountability Office, in a September

¹ U.S. Gov't Accountability Office, *FERC Could Take Additional Steps to Analyze Regional Transmission Organizations' Benefits and Performance* (2008) (Government Accountability Office Report).

² This request was made on May 21, 2007, by Senator Joseph I. Lieberman, Chairman, and Senator Susan M. Collins, Ranking Minority Member, of the U.S. Senate Committee on Homeland Security and Governmental Affairs, in a letter to

2008 Report to the U.S. Senate Committee on Homeland Security and Governmental Affairs, recommended that the Chairman take the following actions: (1) work with RTOs, stakeholders, and other experts to develop standardized measures that track the performance of RTO operations and markets; and (2) report the performance results to Congress and the public annually, while also providing an interpretation of: (a) what the measures and reported performance communicate about the benefits of RTOs and, where appropriate, (b) changes that need to be made to address any performance concerns.³ The Government Accountability Office Report also suggested that performance metrics be explored for non-ISOs/RTOs.

As noted in the Government Accountability Office report, ISO/RTO performance has been an issue of interest to stakeholders and the public since the inception of ISOs and RTOs. The Government Accountability Office and stakeholders acknowledge that ISOs/RTOs provide a significant amount of information that measures the ISO or RTOs' performance, and the ISOs/RTOs communicate their results regularly. But the information being provided is not supplied in a standardized format that allows for a comprehensive perspective of all ISOs/RTOs. The effort described in this paper is intended to address these gaps.

The Performance Metrics effort is also part of the Commission's Strategic Plan, which includes a Metrics Initiative. The first step of that effort is to explore and develop appropriate operational and financial metrics for ISOs/RTOs in fiscal year 2010. The next steps in the Metrics Initiative are as follows: (1) explore and develop appropriate operational and financial metrics for non-ISOs/RTO regions in fiscal year 2011; (2) establish appropriate common metrics between ISOs/RTOs and non-ISO/RTO regions in fiscal year 2012; (3) monitor implementation and performance in fiscal year 2013; and (4) evaluate performance and seek changes as necessary in fiscal year 2014.

To begin the process of developing ISO/RTO performance metrics, Commission Staff initiated a process with the ISOs/RTOs, stakeholders and other experts to develop a set of consensus performance measures. As a first step, Commission Staff developed a broad range of metrics designed to track the

the U.S. Government Accountability Office. The letter expressed the Senators' concern that ISOs/RTOs may not be living up to their full potential with respect to improving efficiencies and reducing costs, and that they might not have adequate incentives to minimize costs.

³ Government Accountability Office Report at 59.

performance of ISOs/RTOs in three specific areas, i.e., reliability, markets and organizational effectiveness. Next, Commission Staff met with the ISOs/RTOs to discuss Commission Staff's proposed metrics and to determine the ability of each ISO/RTO to compute the proposed metrics. Commission Staff then held focused outreach meetings with a variety of industry, consumer, and state regulatory associations⁴ to receive their input. As a follow-up to that outreach, Commission Staff's proposed performance metrics were noticed for public comment and reply comment in Docket No. AD10-5-000 on February 3, 2010.

II. Notice of Filing and Responsive Pleadings

Notice of the February 3, 2010 filing was published in the *Federal Register*, 75 Fed. Reg. 7581 (2010) with comments due on or before March 5, 2010 and reply comments due on or before March 19, 2010. Fifty-nine parties filed comments and reply comments. The parties filing comments are listed in Appendix A.

III. Discussion

A. Procedural Issues

1. Comments

Some commenters⁵ argue that the process used by Commission Staff to develop the ISO/RTO performance metrics inappropriately allowed ISOs/RTOs to develop the proposed metrics. They fault Commission Staff for not starting the process with their recommendations, or basing the proposed metrics on their recommendations. For these reasons, these commenters urge the Commission to start with a clean slate⁶ and to develop, in conjunction with stakeholders, the

⁴ APPA, AWEA, EEI, ELCON, EPSA, NARUC, NASUCA, NECPUC and NRECA. Appendix A to this paper includes a list of intervenors and commenters.

⁵ APPA/ELCON, EMCOS, Industrial Customers, NRECA, ODEC and TAPS.

⁶ Comments of EMCOS at 12 (“For the foregoing reasons, EMCOS request that the Commission reject the proposed RTO Performance Metrics that accompanied its Notice in this proceeding. EMCOS further suggest that the Commission undertake a further proceeding[.]”); Comments of NRECA at 3 (“NRECA concurs and believes that any metrics used to evaluate RTO/ISO benefits and performance should be developed, in the first instance, through the RTOs’/ISOs’ own stakeholder processes.”).

metrics by which the ISOs/RTOs will be evaluated.⁷ Public Systems endorses the issuance of a Notice of Proposed Rulemaking by the Commission and NARUC and DEMEC recommend that the Commission hold technical conferences. Commenters⁸ also assert that the Commission must obligate ISOs/RTOs to issue reports and data, and that either ISOs/RTOs or the Commission must be obligated to take steps to improve performance. EEI expresses its understanding that the Commission has no plans to make the metrics a regulatory requirement; it asserts that the metrics should be for informational purposes only and not used to assess penalties.⁹

With respect to the process going forward, some commenters¹⁰ recommend an ongoing process that allows stakeholders the opportunity for informed review and input before the metrics are finalized or revised from time to time. Others¹¹ suggest that ISOs/RTOs be required to file plans for remediation of deficiencies in their metrics reports, and that these plans should be open for comment. Public Systems asserts that the Commission should be obligated to issue a report and then to issue orders based on comments stating whether the metrics will be retained or revised. Industrial Customers recommend that the Commission, on its own initiative, take all necessary steps to improve ISO/RTO performance. Ohio Consumer Counsel asserts that the Commission should provide a neutral interpretation of the data reported.

⁷ Comments of APPA/ELCON at 8 (“To ensure due process, the Commission must allow all interested parties an equivalent opportunity to participate in the development of these metrics.”); Comments of Public Systems at 2 (“Public Systems urge that the Commission view the current commenting opportunities as the commencement, rather than completion, of a process of performance metric identification, review, and refinement.”).

⁸ APPA/ELCON, Industrial Customers, NEPOOL, New Jersey Rate Counsel and Public Systems.

⁹ Duke, PHI Companies and National Grid also express their concern that the metrics may be used for reliability infractions, and request clarification that the metrics not be used for this purpose.

¹⁰ NEPOOL, NESCOE, Public Systems, SoCal Edison and TAPS.

¹¹ APPA/ELCON, Industrial Customers, NECPUC, NESCOE and New Jersey Rate Counsel.

COMPETE argues for establishing non-ISO/RTO metrics now, rather than next year, to more quickly enable better informed decisions.

2. Response

As outlined above, Commission Staff initiated a process with ISOs/RTOs, stakeholders and other experts to develop standardized performance measures. As discussed below, Commission Staff is taking into account stakeholder recommendations in developing the list of metrics that will be submitted by each ISO/RTO to the Commission. Commission Staff considers this process to be an interactive and transparent development of performance metrics, and does not believe that any benefits from restarting the process would justify the attendant delay in using the draft metrics to gather performance data. Commission Staff's process to develop metrics incorporated a wide range of ISO/RTO and stakeholder perspectives and input.

Some commenters suggest that the Commission must obligate ISOs/RTOs to issue reports and data, and that either ISOs/RTOs or the Commission must be obligated to take steps to improve performance. These suggestions are more appropriate to a rulemaking proceeding than to this proceeding, in which the Chairman and Commission Staff are responding to Government Accountability Office recommendations. It is appropriate to (and sufficient for) this proceeding that the ISOs/RTOs are providing their performance data voluntarily.

Commission Staff clarifies for commenters that the Chairman plans to send Congress a report in 2011 that responds to the Government Accountability Office Report and includes the following information:

- three to five years of historical ISO/RTO performance data, provided by the ISOs and RTOs, on common and standardized metrics for the ISOs/RTOs under the jurisdiction of the Commission;¹²
- an explanation of the metrics and an interpretation of what the measures and reported performance communicate about the benefits of ISOs/RTOs;
- where appropriate, a discussion of possible changes that need to be made to address any performance concerns; and
- a description of the metrics development process, including a description of how the Commission Staff worked with ISOs/RTOs, stakeholders, and

¹² These ISOs/RTOs are ISO New England, Inc., New York Independent System Operator, Inc., PJM Interconnection, L.L.C., Midwest Independent System Operator, Inc., Southwest Power Pool, Inc., and the California Independent System Operator Corporation.

other experts to develop the metrics. The report would commit to filing a follow-up report in the following year.

Commission Staff also clarifies that in fiscal year 2011 it will initiate a voluntary and collaborative process – similar to the process used with ISOs/RTOs -- for developing performance metrics in non-ISO/RTO regions. Inasmuch as the primary focus of the Government Accountability Office recommendations was on ISO/RTO performance measures, Commission Staff allocated its resources to developing performance measures for these first.

B. Policy Issue

1. Comments

Certain municipal power interests, industrial customers and state commissions¹³ question whether organized markets are a better market design than traditional cost-of-service regulation and request detailed cost and revenue data from each generator to test their hypothesis. For example, APPA/ELCON contend that “[a] fundamental argument underlying restructuring of wholesale electricity markets is that competition will be more effective than cost-based price regulation in achieving just and reasonable prices and benefits for consumers. . . . [A] primary measure of the efficacy of competition in a market is whether the price of a good, through competition, is driven down to the marginal cost of producing that good.”¹⁴

APPA/ELCON, Consumer Coalition and DEMEC assert that it is necessary to obtain revenue, cost and profit information on individual generators and demand response resources, in recognition of the fact that the price-cost mark-up data does not reflect data in all ISO/RTO markets, such as those for ancillary services and capacity markets.

Other commenters¹⁵ observe that the Government Accountability Office report raises the question of whether the ISO/RTO construct has provided the promised benefits to customers. They conclude that the only way to answer that question is to compare costs under organized regional markets to costs that would have occurred absent the organized markets.

¹³ APPA/ELCON, California PUC, EMCOS, Ohio PUC and Public Systems.

¹⁴ Comments of APPA/ELCON at 13.

¹⁵ Industrial Customers, Maryland PSC and TANC.

APPA/ELCON, California PUC, TAPS and Commissioner Tyrone Christy¹⁶ assert that organized regional energy markets may be allowing participants to exercise potentially inappropriate market power, i.e., prices in organized regional markets may be exceeding marginal costs, and therefore the resulting rates are not just and reasonable. In supplemental comments, APPA/ELCON provided return on equity data for unregulated generation providers in the PJM Interconnection that shows a return on equity range of 12 to 31 percent for these suppliers.¹⁷ APPA/ELCON considers these returns to be high and a strong indicator of the need for further investigation to ensure rates are just and reasonable.

Opposing these positions, the Federal Trade Commission considers an evaluation of the justness and reasonableness of an ISO/RTO market design using a single-clearing-price, market-based rate regime to be beyond the scope of the performance metric initiative.

EPSA points out that it is a collateral attack on the legality of market-based pricing to assume that the just and reasonable standard requires marginal cost pricing. EPSA also cites to court precedent affirming that the Commission may rely upon market-based prices in lieu of cost-of-service regulation where the Commission has found that buyers and sellers lack market power. IPPNY and P3 support these comments. EPSA, MidAmerican and IRC note that the Commission conducts triennial reviews to determine whether markets are sufficiently competitive to support market-based rates, and these markets are monitored on a daily basis by market monitors and the Commission's Office of Enforcement.

EPSA and MidAmerican consider measuring a variety of generator-specific cost and revenue information to be inappropriate since this information does not reflect market success or ISO/RTO benefits. The ISO New England Market Monitor opposes the gathering and publishing of data on the financial performance of individual market participants, since these data are not good measures of market performance. FirstEnergy considers the cost-of-service preference of APPA/ELCON and other parties to be short-sighted since it will result in low short-term prices to the detriment of future resource investment and sustainable electric markets.

¹⁶ Vice Chairman, Pennsylvania PUC.

¹⁷ This data is provided in *2009 Financial Performance of Owners of Unregulated Generation*, issued in May 2010.

2. Response

Commission Staff considers the APPA/ELCON position to be a criticism of the Commission's ISO/RTO market design using a single-clearing-price market-based rate policy, and not an ISO/RTO performance issue. ISOs/RTOs can only implement the Commission-approved market-based rate design for their organized markets. Therefore, it is appropriate to evaluate the performance of ISOs/RTOs based on the market design that the Commission has approved. Commission Staff agrees with the point made by the Federal Trade Commission in its reply comments:

This proposal confuses policy performance with organizational performance metrics. FERC's use of a single market-clearing price approach for compensating generators – rather than a pay-as-bid approach combined with plant-specific price controls – reflects an energy policy decision. The results of that policy decision are not under the control of RTOs. Thus, using generator costs compared to revenues as a performance metric for RTOs would hold those organizations accountable for results that reflect FERC policy choices. For this reason, we recommend that FERC not adopt generator costs compared to revenues as a performance metric for RTOs.”¹⁸

At the same time, however, Commission Staff recognizes that generator profits may be reflective of competitive market conditions; therefore, metrics on the price-cost mark-up¹⁹ and generator net revenues are being added, as discussed in the Market Competitiveness Metrics discussion below.

C. Metrics Issues

1. General Issues

a. Comments

Most commenters consider Commission Staff's proposed performance metrics to be a good start toward developing useful, meaningful metrics.

¹⁸ Federal Trade Commission Reply Comments at 8.

¹⁹ California PUC, EMCOS, and NRECA endorse this metric.

NEPOOL notes that, for New England, much of the specific data and information identified in the proposed metrics is already reported by ISO New England or otherwise publicly available, as required by the NEPOOL Participants Agreement.

At the same time, a number of commenters²⁰ urge the Commission to re-evaluate the purpose of developing metrics, particularly in terms of their ability to provide meaningful indicators of performance. They assert that the only useful metrics are those that measure activities over which the ISOs/RTOs have control, or that represent key functions of ISOs/RTOs. These commenters consider a number of the draft performance metrics to be inappropriate, since they are influenced primarily by other market participants or are subject to a variety of market forces, such as transmission outage coordination and generator availability.

In addition, Midwest ISO Transmission Owners and PHI Companies assert that the quantitative information provided in the ISO/RTO Performance Metrics will be meaningless without any context as to the underlying circumstances that affected the metric. For this reason, NECPUC recommends that ISOs/RTOs be required to submit a narrative on each metric that explains and interprets the data. Many of these commenters urge the Commission to recognize regional differences among ISOs/RTOs.

Finally, commenters raise concerns that Commission Staff's proposed performance metrics do not include important metrics or are not designed appropriately to provide meaningful measures, as follows.

- The Federal Trade Commission recommends a grid efficiency performance metric to measure an RTO's contribution to the effective functioning of the broader power system through economic dispatch efficiency, cooperation with interconnection-wide planning efforts and constructive work to resolve seams issues. Similarly, NY Transmission Owners endorse measuring ISO/RTO effectiveness in eliminating seams between markets and a measure of the inefficiencies caused by unauthorized loop flows. The Federal Trade Commission also asserts that there should be metrics on the minimum characteristics and functions specified in Order No. 2000²¹ in

²⁰ Midwest ISO Transmission Owners, National Grid, NECPUC, NEPOOL and United Illuminating.

²¹ *Regional Transmission Organizations*, Order No. 2000, FERC Stats. & Regs. ¶ 31,089 (1999), *order on reh'g*, Order No. 2000-A, FERC Stats. & Regs. ¶ 31,092 (2000), *aff's sub nom. Pub. Util. Dist. No. 1 of Snohomish County Washington v. FERC*, 272 F.3d 607 (D.C. Cir. 2001).

order to avoid the worst problems that can arise from using incomplete performance metrics.

- Commenters²² recommend that ISOs/RTOs be required to undertake cost-benefit studies on their major functions, to determine whether the functions can be justified and to ensure accountability for ISO/RTO projections.
- NARUC endorses the development of a baseline by which to compare the ISOs/RTOs to regions outside these organized markets.
- The ISO New England Market Monitor recommends that the metrics include the following information: capacity market prices, capacity market quantities offered and cleared, capacity required, the amount of existing capacity and the amount of capacity added and retired each year. The New England Market Monitor asserts that this information is required to indicate whether the market is supporting new investment and efficient turnover of assets. Dominion endorses a similar list of metrics. Ohio Consumer Counsel also supports capacity price metrics and OMS supports metrics on the cost of capacity and the method of compensating capacity in each ISO/RTO.
- ITC asserts that ISO/RTO performance should be measured based on whether the regional entity has established clear cost allocation policies for new transmission. AWEA recommends a metric to measure the percent of transmission projects that qualify for cost sharing.
- Certain commenters²³ suggest metrics to measure a wide range of market structure data such as virtual bid and offer prices, credit defaults, liquidity of exchange-traded energy, dollars transacted in each market (energy, ancillary services, FTRs, virtual transactions) and lists of ISO/RTO products.

In response to comments on the metrics, IRC asserts that the primary purpose of the metrics is to provide a common database for the collection of metrics in a uniform format and that metrics are not intended to substitute for

²² EMCOS, New Jersey Rate Counsel, Ohio Consumer Counsel and TAPS.

²³ Allegheny, APPA/ELCON, California DWR, DC Energy, NRECA, Ohio PUC and SoCal Edison.

review and adjudication of tariffs under sections 205 and 206 of the Federal Power Act.²⁴

2. Response

Based on the comments received, Commission Staff has revised the metrics listed in the February 3, 2010 list of proposed performance metrics. The full list of revised metrics (ISO/RTO Performance Metrics) is provided in Appendix B.

The ISO/RTO Performance Metrics discussed below measure ISOs/RTOs' performance in terms of their ability to administer their markets efficiently and ensure reliability. ISO/RTO operations and administration are designed to provide benefits in an efficient manner that provides value to consumers. A number of metrics are influenced by factors beyond the control of ISOs/RTOs; nonetheless, they provide useful information on trends in the ISO/RTO markets that reflect on ISO/RTO operations, as discussed with regard to the individual metrics, below.

Commission Staff is recommending that the ISO/RTO reports include narrative explanations to accompany the ISO/RTO data on performance metrics on a number of issues of concern to commenters. In these narratives Commission Staff encourages the ISOs/RTOs to quantify their information to the extent data is available and to provide information on metrics that the individual ISOs/RTOs are finding useful to track, even if they are not on the list of metrics in Appendix B. For example, PJM performs a perfect dispatch analysis to provide insights into how its organized markets are performing. This type of quantification and exploration of potential metrics will facilitate the evolution of the performance metrics.

Commission Staff agrees with the Federal Trade Commission that measurement of ISO/RTO performance should consider the regional entities' efforts to constructively resolve interconnection-wide issues and seams issues. Commission Staff expects that this information can be communicated most effectively in a narrative discussion since there is not a standardized product from these efforts that can be easily put into a metric. The metrics discussions that follow address the performance of ISOs/RTOs in carrying out the other minimum functions²⁵ specified in Order No. 2000 (excluding the open-access same-time

²⁴ 16 U.S.C. §§ 824d, 824e (2006).

²⁵ The Order No. 2000 minimum functions are tariff administration and design, congestion management, parallel path flow, ancillary services, open access same-time information system, total transmission capability, available

information system and available transmission capability calculation function, which do not bear directly on ISO/RTO performance).²⁶ The ISO/RTO Performance Metrics do not address the minimum RTO characteristics that are prescribed in Order No. 2000 (independence, scope and configuration, operational authority and short-term reliability) since these characteristics explain what the RTOs are, and not what they do; as such, the minimum characteristics do not provide information on the performance of ISOs/RTOs.

Commission Staff considers a number of other commenters' recommendations to be beyond the scope of this metrics effort. For example, recommendations for cost-benefit studies and baseline analyses would provide analyses of interest to stakeholders. However, these analyses are intended to serve other purposes, such as a benchmark for industry practices, that go beyond the purpose of this effort. Other recommendations are measures of Commission policies, rather than measures of ISO/RTO performance. These include ITC's recommendation for a metric on whether an ISO/RTO has established a clear cost allocation policy for new transmission and AWEA's proposed metric on cost sharing.

Certain commenters recommend metrics that would be redundant of the proposed metrics. For example, recommendations for capacity market metrics to measure investment in capacity and capacity offers, bids and prices are intended to measure resource adequacy performance, which is already being measured in the Long-Term Reliability Planning metrics in the reserve margin metrics. While Commission Staff will not include these additional metrics, Commission Staff expects that the narrative discussion accompanying the reserve margin metric will address investment and capacity market impacts on resource adequacy.

Finally, there are a number of recommendations for metrics that provide market information, but have no relation to ISO/RTO performance, such as recommendations for market structure data, virtual bid and offer prices, credit defaults, liquidity of exchange-traded energy, dollars transacted in each market (energy, ancillary services, FTRs, virtual transactions) and lists of ISO/RTO products. Commission Staff does not consider this data relevant to ISO/RTO performance metrics and therefore will not request the development of metrics based on this information.

transmission capability, market monitoring, planning and expansion and interregional coordination.

²⁶ The parallel path flow function will be included in the narrative explanation of interconnection-wide issues and seams issues.

3. Discussion of Individual Metrics

The three major categories of performance metrics are reliability, market benefits and organizational effectiveness. The reliability performance metrics, discussed first, were chosen to measure the reliability of day-to-day operations in metrics such as compliance with national and regional reliability standards, dispatch, forecasting and Special Protection Schemes as well as to measure long-term reliability in metrics such as long-term generation and transmission planning. The market benefits metrics were chosen to measure the performance of ISOs/RTOs based on market prices, congestion management costs and resource availability and to measure the efficiency of ISO/RTO markets in price convergence and competition metrics. Finally, the organization effectiveness metrics were chosen to measure ISO/RTO performance in accomplishing their objectives in a cost-effective manner that provides value to market participants.

The individual metrics are discussed in the order they are listed in Appendix B.

a. National and Regional Reliability Standards Compliance Metrics

i. ISO/RTO Performance Metric

This metric measures the number of violations of national and regional reliability standards and provides additional information on how these violations were reported (self-reported or reported in audits) and the severity of the violations. It thereby indicates both the significance of the violation and the effectiveness of self-reporting procedures in identifying violations in a timely manner. This metric is intended to be a comprehensive measure of reliability performance based on functions undertaken by ISOs/RTOs.²⁷ The metric also includes unserved energy (or load shedding) caused by violations.

ii. Comments

EEI contends that measuring reliability performance on the basis of aggregate violations will not provide an accurate representation of system performance and that it is not possible initially to determine whether an increase or

²⁷ A full listing of the reliability standards is provided at <http://www.nerc.com/page.php?cid=2|20>.

decrease in self-reported violations is good or bad. EEI also observes that a self-reported violation metric may discourage self-reporting. EPSA asserts that violation data should be supporting information only since increases/decreases in these measures are not indications of performance.

The California PUC recommends that ISOs/RTOs report the number of violations regarding the NERC standard on operating reserve requirements. NRECA recommends that this performance measure include megawatt-hours of energy, and the number of customers, unserved due to violations. OMS states that making an explicit recognition of the difference in ISO/RTO size would be beneficial for the interpretation of relative ISO/RTO performance.

iii. Response

Responding to commenters that question whether these metrics are accurate representations of system performance, Commission Staff considers the metrics to be basic measures of reliability in ISOs/RTOs and therefore they must be included in a report on ISO/RTO operating performance.²⁸ Commission Staff considers this information to be the basic building block from which a meaningful assessment of ISO/RTO reliability performance must start. Responding to EEI's comments on self-reporting violations, Commission Staff notes that self-reported violations can indicate an entity is improving its own compliance and catching problems early. The Commission reaffirmed this in its Revised Policy Statement on Penalty Guidelines.²⁹ Consistent with the Commission's position on self-

²⁸ Commission Staff expects, per the Commission's regulations on the enforcement of reliability standards, that the report would not identify any nonpublic violations or any other non-public information related to cyber security incidents or violations that could similarly jeopardize the bulk power system until the information had been released by the Commission. *See* 18 C.F.R. § 39.7(b)(4) (the disposition of each violation or alleged violation that relates to a Cybersecurity Incident, or that would otherwise jeopardize the security of the Bulk Power System if publicly disclosed shall be nonpublic unless the Commission directs otherwise.)

²⁹ *See Enforcement of Statutes, Orders, Rules and Regulations*, 132 FERC ¶ 61,216 (2010) at P 141 (Self-reports, for example, add significant value to overall industry compliance, and the Commission will continue to place great importance on self-reporting. As we stated in the 2005 Policy Statement, "[c]ompanies are in the best position to detect and correct violations of our orders, rules and regulations, both inadvertent and intentional, and should be proactive in doing so." Providing credit for self-reporting gives organizations an incentive to detect and

reporting, Staff does not expect that a self-reported violation metric will discourage self-reporting. In addition, NERC already makes public filings to the Commission of self-reported violations, so the total number of self-reported violations will not be new information. RTOs will have the opportunity to explain specific circumstances in the narrative accompanying the metrics.

Commission Staff agrees that the number of violations, alone, does not provide meaningful information. Rather, the significance of the violations and the context of their occurrence will be communicated in the narrative summaries that will accompany the metrics. Based on comments received, metrics on compliance with operating reserves standards and unserved energy (or load shedding) caused by violations are included in the ISO/RTO Performance Metrics. Consistent with the Revised Policy Statement on Penalty Guidelines, Commission Staff recommends that the unserved energy metric be calculated as the quantity of load lost, in MWh, as a measure of the seriousness of the violation, rather than a specific, individualized assessment of the value of losses of load that result from reliability violations.³⁰ Responding to OMS, Commission Staff expects that the narrative explanation that accompanies the metrics will provide the necessary context as to the scale and configuration of each ISO/RTO to allow for a meaningful interpretation of the metrics.

b. Dispatch Reliability Metrics

i. ISO/RTO Performance Metric

Dispatch reliability is measured by three metrics. The first metric measures the performance of ISO/RTO dispatch operations in maintaining interconnection steady-state frequency within defined limits by balancing power demand and supply in real time. This is evaluated using Control Performance Standards 1 and

correct violations early. Self-reporting also assists the Commission's review of violations and facilitates the process of providing remedies to affected parties.)

³⁰ *Id.* at P 4.

2.³¹ An alternative method of measurement is using the Balancing Authority Area Control Error Limit.³²

The second metric measures the number of transmission loading relief or unscheduled flow events that required ISO/RTO actions to manage transmission flows in response to congestion for level three severity events and higher. This metric indicates how often ISOs/RTOs must resort to manual actions to redirect physical flows and therefore is an indication of the frequency of events that cannot be managed through ISO/RTO dispatching and unit commitment.

The third metric measures the availability of energy management system hardware and software, such as state estimators, for performing real-time monitoring and security analysis functions. Availability is measured as the percentage of hours that the energy management system is operationally available.

ii. Comments

Duke considers the value of the transmission loading relief/unscheduled flow metric to be questionable since ISOs/RTOs have different load profiles, resources and other variables. For this reason, Duke contends that the transmission loading relief/unscheduled flow metric must factor in different operating practices and system configurations of ISOs/RTOs to be an effective metric. Midwest ISO TOs and Mid-American also consider the transmission loading relief/unscheduled flow metric to be of little value unless compared to the number of similar events in regions with no organized markets. NEPOOL states that the number of transmission loading relief events does not evaluate efficient outcomes and may not be wholly applicable to New England

Midwest ISO TOs recommend that the transmission loading relief/unscheduled flow metric also include information on the magnitude of transmission loading reliefs and the amount of energy curtailed via transmission

³¹ Control Performance Standard 1 is a statistical measure of Area Control Error variability. This standard measures Area Control Error in combination with the Interconnection's frequency error. It is based on an equation derived from frequency-based statistical theory. Control Performance Standard 2 is a statistical measure of Area Control Error magnitude. The standard is designed to limit a control area's unscheduled power flows.

³² Procedures for the Balancing Authority Area Control Error Limit methodology can be found at http://www.nerc.com/docs/standards/sar/Supporting_Documents.pdf.

loading reliefs relative to the total amount of megawatt-hours transferred across an ISO or RTO region. The Pennsylvania PUC also recommends that the metric report transmission loading relief events by severity and category and separately categorize transmission loading relief events called due to events within the ISO/RTO and those called by outside coordinators. EPSA supports a metric to measure energy management system availability.

iii. Response

Commission Staff agrees with commenters that events requiring transmission loading relief are a function of a wide range of factors outside ISO/RTO control, such as system configuration, weather, and load shifts. The purpose of ISO/RTO systems such as Security Constrained Economic Dispatch, however, is to resolve system constraint problems and thereby to avoid reliance on physical and manual procedures such as transmission loading relief that are more costly, less efficient and less reliable. For example, Security Constrained Economic Dispatch economically dispatches resources that have the greatest impact on a constrained facility first and thereby minimizes out-of-merit dispatch and the associated loss of system efficiency. Also, Security Constrained Economic Dispatch reduces flows on constrained transmission lines much more quickly and reliably than transmission load relief. For these reasons this metric, with appropriate narrative explanations and evaluated over a number of years, will provide an important indication of the trends of the effectiveness and efficiency of each ISO/RTO's operating performance. Commission Staff agrees with commenters that the transmission loading relief/unscheduled flow metric can be improved with severity information and energy curtailment data and for this reason this information should be included in the metrics, to the extent the information is available. For ISO New England, which does not use transmission loading relief, a narrative explanation should be provided on its management of transmission flows. Responding to EPSA, the ISO/RTO Performance Metrics include an energy management system availability metric.

c. Load Forecast Accuracy Metric

i. ISO/RTO Performance Metric

Actual load as a percentage variance from forecasted load, for both peak and off-peak periods, measures the effectiveness of the load forecasting function of ISOs/RTOs. Since load forecasting provides the basis for resource commitment, this metric impacts the incurrence of resource costs. The more accurate an ISO/RTO is in forecasting load, the greater the likelihood that it can commit sufficient resources in a cost effective manner that avoids over-commitment of resources, inefficient commitment of short lead-time resources or

under-utilization of available resources. This metric measures the percentage difference between actual load and forecasted load and the mean absolute percentage error of day-ahead forecasts for all hours, the peak hour and the valley hour. The mean absolute percentage error will be measured as the yearly average error for all hours, the peak hour and the valley hour.

ii. Comments

Midwest ISO TOs and Duke question whether cross-ISO/RTO comparisons are meaningful because of regional differences. They also recommend: (1) that the metric be designed to account for the use of interruptible and other demand response resources during periods of high energy prices resulting in changes to actual load figures, and (2) that the metric be limited to day-ahead forecasting and thereby minimize the impact of weather variability. Ohio Consumer Counsel requests clarification on the time-frames to be measured and recommends a metric to measure the fees assessed for system imbalances caused by inaccurate load forecasting. NECPUC recommends additional specificity as to whether the forecasts are made on a weather-normalized basis. The New Jersey Rate Counsel endorses metrics to measure long-term peak load forecast error, defined to be the difference between the most recent forecast and the weather-normalized actual peak load.

iii. Response

Commission Staff clarifies for Midwest ISO TOs, Duke and Ohio Consumer Counsel that the metric is based on the day-ahead forecast and that the metric is calculated as the mean average of the absolute difference between the forecasted load and the actual load divided by the forecasted load for all relevant hours. Calculations will be made for the yearly average for all hours, the yearly average for the peak hour (the highest load hour) of each day, and the yearly average for the valley hour (the lowest load hour) of each day. The forecasts will account for the impact of interruptible load and demand response resources. Inasmuch as this metric is a day-ahead forecast measure, the measure minimizes the impact of weather variability that may result in regional differences in forecast accuracy.³³

Commission Staff understands New Jersey Rate Counsel's concern to be with the load forecasting process associated with resource adequacy planning. Commission Staff expects that these long-term forecasts will be constantly shifting

³³ We discuss the issue raised by Ohio Consumer Counsel of costs associated with system imbalances in the Resource Availability section below.

over time, to account for a number of factors such as the impact of economic trends, new technologies and population shifts. Therefore, Commission Staff does not consider comparisons of long-term forecasts or forecast errors to be appropriate as an ISO/RTO performance metric. At the same time Commission Staff recognizes that under-forecasting load can be a factor that leads to actual reserve margins being below the forecast reserve margin, to the detriment of reliability. To the extent under-forecasted load plays a role in achieving the target reserve margin, this information will be addressed in the narrative explanation accompanying the long-term generation reliability metric.³⁴

d. Wind Forecasting Accuracy Metric

i. ISO/RTO Performance Metric

This metric measures the percentage accuracy of actual wind availability compared to forecasted wind availability as of the close of the prior day's day-ahead market. Improving the accuracy of the wind forecast will facilitate the timely commitment and dispatch of sufficient supplemental resources.

ii. Comments

California DWR asserts that this information should be a performance metric and should be expanded to include solar, tidal and other intermittent resources. California PUC recommends that the metric be standardized for comparative purposes. National Grid endorses making this information a future metric once wind monitoring and forecasting systems are in place. EEI considers proposals to make this information into a performance metric to be premature since the Commission is still investigating the benefits of gathering meteorological data in Docket No. RM10-11.³⁵

iii. Response

Responding to California DWR and California PUC, Commission Staff is including wind forecasting as a standardized ISO/RTO Performance Metric in recognition of the growing significance of this resource for nearly all of the ISOs/RTOs. In recognition of the fact that forecasting for other variable energy

³⁴ Information in the narrative on over-forecasting of load would also have value. Over-forecasting can also be detrimental to ISO/RTO market efficiency since it leads to over-procuring of capacity and higher than necessary costs.

³⁵ *Integration of Variable Energy Resources*, 130 FERC ¶ 61,053 (2010).

resources is either not performed by all ISOs/RTOs or is not performed according to a standardized process that allows for comparison, Commission Staff will not include the forecasts of other variable energy resources as performance metrics and instead Commission Staff considers it appropriate that the narrative discussions that accompany the metric include a discussion and quantification of forecast accuracy for those variable energy resources that ISOs/RTOs forecast. Responding to National Grid and EEI, Commission Staff considers it appropriate to include wind forecasting accuracy as a metric since most ISOs/RTOs have wind forecasting processes in place. Commission Staff does not find any basis to conclude that the data and analysis developed in this report will impact the Commission's inquiry into eliminating barriers to the integration of variable energy resources in Docket No. RM10-11. Our report simply reports the accuracy of wind forecasts, whereas the inquiry has a different focus, namely to explore, among other issues, various techniques to improve data gathering and forecasting for variable energy resources.

e. **Unscheduled Flows Metric**

Unscheduled flows are defined as the difference between net actual interchange (actual power flow measured in real time) and the net scheduled interchange. The two components of unscheduled flows are inadvertent energy, defined to be the difference between actual and scheduled interchange for all interties, and parallel flow (or loop flow), defined to be the actual power flow on a contract path within an interconnection from one Balancing Authority Area to a second Balancing Authority Area via "parallel" transmission lines through a third Balancing Authority Area.³⁶ Parallel flows are a function of the interconnection's operating configuration, line resistance and physics. When unscheduled flows exceed system operating limits, curtailments may occur and efficient scheduling of the grid could be hindered. Accordingly, unscheduled flows provide information relevant to operational planning that is part of a comprehensive assessment of the reliability and efficiency of ISO/RTO markets. This metric is measured by the absolute value of megawatts of unscheduled flows over a year and as a percentage of total flows. No comments were submitted on unscheduled flows.

f. **Transmission Outage Coordination Metric**

*i. **ISO/RTO Performance Metrics***

³⁶ Parallel flows net out in an ISO/RTO region and therefore they do not contribute to inadvertent interchange.

Effective transmission outage coordination is defined as early notification of planned outages of five days or longer – i.e., notification at least one month prior to the outage commencement date – and timely review of outage impacts, per ISO/RTO-established timeframes. Effective transmission outage coordination is also measured by the percentage of planned outages that are cancelled due to conflicting planned outages as well as forced (unscheduled) outages that could cause reliability issues and additional congestion costs.³⁷ Effective transmission outage coordination by ISOs/RTOs ensures that outages do not threaten system reliability and that additional, and potentially more expensive, resources do not need to be committed.

ii. Comments

Some commenters³⁸ argue that this metric is not reasonably related to any function that an ISO/RTO can perform because timely reporting of an outage is under exclusive control of transmission owners. NEPOOL recommends that the metric be modified to differentiate between reasons for outages, and suggests that a better metric would be transmission outages that affect generation availability. Midwest ISO TOs state that measuring an ISO/RTO response to planned outages better demonstrates the effectiveness of ISO/RTO transmission outage coordination. They also recommend revising the percentage of 200 kV and above outages (both planned and unplanned) with less than two days' notice by replacing "unplanned" with "emergency" since "unplanned" is too broad a term. DC Energy suggests measuring the one-month notification metric based on outages of one day, instead of the proposed five day outage metric.

iii. Response

Although transmission outage notices are the responsibility of transmission owners, and not ISOs/RTOs, Commission Staff expects that this measure will illuminate the effectiveness of coordination between transmission owners and ISOs/RTOs. Commission Staff expects that the narrative discussion accompanying the metric will identify the impact of transmission outages on generation availability and on declared emergencies, as requested by NEPOOL and Midwest ISO TOs. Responding to DC Energy, Commission Staff agrees that outages of less than five days can be significant events that require advance notification and therefore this information should be included. Accordingly,

³⁷ The proposed metrics will measure outages for major transmission facilities, which are defined, for purposes of the metrics, as 200 kV and higher.

³⁸ CAISO, EEI, Mid-American, Midwest ISO and Midwest ISO TOs.

Commission Staff would consider the addition of this information to be appropriate when the ISOs/RTOs have collected the necessary information, for possible inclusion in a follow-up report.

g. Long-Term Reliability Planning – Transmission Metric

i. ISO/RTO Performance Metrics

This metric tracks the number of facilities approved to be constructed for reliability purposes, the percentage of approved construction projects on schedule and completed and the number of completed reliability and economic studies. This information measures the effectiveness of the ISO/RTO expansion planning process in identifying system reliability and economic needs in advance, thereby providing sufficient time for market participants to develop either a market-based solution (e.g., merchant transmission line, power plant or demand response) or a regulated solution (e.g., transmission line) to system reliability and economic requirements. The metric also measures the impact of demand response on the type and cost of infrastructure investment.

ii. Comments

Certain commenters³⁹ recommend additional metrics to measure project costs. ITC recommends that this metric be developed based on all transmission planning, not just reliability planning, and proposes a metric to measure the extent to which efficient and innovative technologies are deployed. National Grid recommends that the metric be based on transmission planning for both reliability and economics.

Other commenters⁴⁰ assert that simply measuring the number of facilities approved does not provide an accurate assessment of ISO/RTO effectiveness to address reliability issues. TAPS recommends an additional metric for the status of approved transmission construction projects. Commenters⁴¹ also note that the percentage of approved construction on schedule and completed is often beyond the control of the ISO/RTO. NEPOOL states that the metric needs to distinguish ISO/RTO performance from transmission owner performance. NECPUC notes

³⁹ California DWR, NECPUC, NEPOOL and OMS.

⁴⁰ Duke, EEI, EPSA and Midwest ISO TOs.

⁴¹ Duke, EPSA, Mid-American, Midwest ISO TOs and NECPUC.

that ISOs/RTOs do not approve project construction, and therefore the metric needs to be revised.

COMPETE recommends measuring the penetration of innovative resources such as flywheels and battery storage. Ohio Consumer Counsel endorses a metric on storage technologies.

iii. Response

The primary purpose of this metric is to assess the extent to which transmission solutions are deployed to meet reliability requirements, and therefore the cost, congestion and innovative technology measures that commenters suggest would go beyond the scope of the metric. With regard to OMS's interest in a congestion relief metric, the narrative discussion that accompanies the Congestion Management metric, discussed below, will explain the impact of transmission planning on congestion trends. Responding to ITC and National Grid, the third metric listed in Appendix B measures both reliability and economic studies, and therefore addresses all project planning, including economic projects. Considering their growing importance in ISO/RTO operations, Commission Staff agrees with commenters that information should be provided on the integration of innovative technologies such as flywheels and battery storage into ISO/RTO markets in the narrative explanations.

Commission Staff agrees with commenters that ISOs/RTOs should include a narrative discussion with this metric that explains the significance of the metrics data and provides a context to evaluate the benefit of ISO/RTO expansion planning. Commission Staff also expects that the supplemental information provided by ISOs/RTOs and the narrative discussion will address the status of approved construction projects. While Commission Staff agrees with commenters that the construction of planned projects is beyond the control of ISOs/RTOs, Commission Staff notes that most of the metrics measure project approvals in the expansion planning process⁴² and the completion of expansion studies, all of which are under the control of the ISOs/RTOs. Since project construction is the end result of these processes, Commission Staff includes this metric as one of the measures of the effectiveness of transmission planning.

h. Long-Term Reliability Planning – Resources Metric

⁴² We clarify for NECPUC that the project approval metrics measure the number of reliability projects added to ISO/RTO expansion plans.

i. ISO/RTO Performance Metrics

Four metrics are employed to measure the effectiveness of long-term reliability planning by ISOs/RTOs. The first metric, processing time for generation interconnection requests, measures the effectiveness of ISO/RTO processes in achieving timely interconnection of new resources that are needed to ensure reliability. The second metric, actual reserve margins⁴³ compared to planned reserve margins, measures the extent to which ISO/RTO generation resource planning processes are ensuring long-term resource adequacy and reliability. The third metric, the percentage of planned outages that are cancelled by ISOs/RTOs, provides an indication of the effectiveness of ISO/RTO in administering generation outage schedules. For example, a low cancellation percentage indicates that generation owners were allowed to complete nearly all the maintenance they had planned without incurring rescheduling costs or delays. And the fourth metric, the number of generating units and their capacity under reliability-must-run contracts, provides a measure of the degree to which an ISO/RTO must depend on critical facilities to maintain reliability and the flexibility of an ISO/RTO system to respond to emergencies and other contingencies.

Two metrics measure the impact of demand response on long-term reliability.⁴⁴ These are (1) the demand response share of total capacity, measured in megawatts, and (2) the demand response share of ancillary services, measured in megawatt-hours.

ii. Comments

Dominion supports a metric that reports planned generation outages that are cancelled or rescheduled after previous RTO approval, as a measure of the effectiveness of ISO/RTO handling of generation outage schedules. EPSA recommends a metric that measures the number of generating facilities and megawatt capability of units retained under reliability must run contracts. The Massachusetts AG endorses a measure of the megawatts procured in excess of the regional installed capacity requirement and capacity costs incurred in excess of the market clearing price. New Jersey Rate Counsel considers long-term peak load data and forecasts to be an important input to resource adequacy plans, as well as

⁴³ The reserve margin is the number of megawatts of resources available as system reserves divided by the number of megawatts of peak load.

⁴⁴ These metrics were originally listed in a separate demand response metric in the proposed performance metrics.

transmission and generation planning, and for this reason recommends including metrics to measure long-term load forecast error. New Jersey Rate Counsel also recommends metrics to measure deviations between actual reserve margins and projected reserve margins, with discussion of reasons for deviations. To recognize issues such as future carbon regulation and renewable portfolio standards, Ohio Consumer Counsel recommends that ISOs/RTOs be required to report additional information on the carbon contributions and generation fuels of ISO/RTO generation portfolios, the intended use of the generation additions and the target load or constraint the generation additions will serve. Ohio Consumer Counsel also endorses a metric to assess the actual reserve margin from an economic perspective using the projected value of lost load.

With respect to the demand response metrics, EPSA supports a metric to measure the impact of demand response in peak conditions. Steel Producers support a metric to measure the impact of demand response in providing ancillary services. Steel Producers also argue for a more specific breakdown of the types of demand response used in each ISO/RTO to include categories such as regulation service, and for more refined metrics on the activity of these resources.

Other commenters⁴⁵ consider these metrics to be beyond ISO/RTO control and therefore not suitable as performance metrics. NESCOE notes that these metrics are developed within the states' energy and environmental planning and policy frameworks. EEI and NEPOOL assert that the metrics are not meaningful since there are differences in resource mix, fuel prices, congestion and demand response efficiency capability in each ISO/RTO.

iii. Response

Commission Staff notes that the generation outage and reliability-must-run metrics supported by Dominion and EPSA are included in the metrics. Since the purpose of the metric is to measure reliability impacts, Commission Staff does not consider the capacity market efficiency and cost metrics proposed by the Massachusetts AG to be appropriate. At the same time, Commission Staff agrees with the Massachusetts AG that the efficiency of ISO/RTO capacity markets should be evaluated in a performance review. Since several ISOs/RTOs are not required to purchase capacity for their region and therefore these efficiency measures do not reflect their performance, a performance metric would not be appropriate. For those ISOs/RTOs that do perform this function, this capacity efficiency and cost information can be discussed in the narrative explanation that accompanies the total power cost metric, discussed below, for the capacity cost

⁴⁵ Allegheny, Midwest ISO TOs, and NESCOE.

component. Commission Staff agrees with New Jersey Rate Counsel that reserve margin estimates are important ISO/RTO functions that should be evaluated as part of an ISO/RTO performance review. The primary focus of this metric, however, is to measure the performance of ISOs/RTOs in achieving resource adequacy. Accordingly, Commission Staff agrees that it is appropriate that there be a discussion of a number of factors that impact the adequacy of the actual reserve margin vis-à-vis the projected reserve margin, including load forecasts and energy efficiency trends, in the narrative explanation that accompanies the metric, rather than creating an additional metric.⁴⁶ Commission Staff also notes that reserve margin analysis varies from one ISO/RTO to another, as New Jersey Rate Counsel also recognizes, and therefore metric information would not be comparable across ISOs/RTOs.

The additional information regarding fuel mix and carbon emissions that Ohio Consumer Counsel recommends collecting does not measure ISO/RTO performance with respect to long-term reliability planning. The metrics relating to fuel diversity, demand response, and renewables, however, will provide information relevant to the issues of concern to Ohio Consumer Counsel, as discussed below. Commission Staff does not agree with the recommendation to require information on the value of lost load since Commission Staff does not consider this information to be pertinent to measuring the long-term reliability planning performance of ISOs/RTOs.

Regarding the demand response metrics, Commission Staff recognizes that the amount of demand response in a market is not under the direct control of ISOs/RTOs, and that they are influenced by a number of factors, such as state demand response initiatives. Nonetheless, these metrics may be useful indicators of the impact on long-term reliability planning. Commission Staff recognizes that regional differences among the ISOs/RTOs will result in differing integration results for demand response resources.

With respect to comments requesting more granularity in the data and more refined metrics, Commission Staff considers demand response data for separate ancillary services markets to be appropriate, as recommended by commenters, to the extent it is available.

⁴⁶ We note that we also consider it appropriate to include information on the load forecasting process for resource adequacy in the narrative explanation, as discussed in the Load Forecasting Accuracy section above.

i. Infrastructure Investment – Interconnection and Transmission Process Metrics

i. ISO/RTO Performance Metrics

These metrics track the progress made by ISOs/RTOs in completing their reliability reviews – namely, feasibility, system impact and facility studies – of interconnection and transmission service requests in a timely and efficient manner. The metrics track the number of requests, the time required to complete the reliability reviews and the costs of completing each of the three types of studies.

ii. Comments

ITC and EPSA support this performance metric. California PUC recommends that the information be clarified and normalized to facilitate benchmarking or comparative assessments. Ohio Consumer Counsel endorses reporting the information by utility and by independent power provider as well as providing information on formal complaints filed. Duke asserts that the interconnection and transmission service requests must be differentiated.

iii. Response

Responding to California PUC and Ohio Consumer Counsel, Commission Staff expects that the narrative explanation that accompanies this metric will address why there are differences between ISOs/RTOs in the completion and timing of transmission studies, as well as information on the types of entities being interconnected and the status of formal complaints. While Commission Staff agrees with Duke that the information would be more meaningful if it had separate information for interconnections and transmission service requests, this information is not available from the ISOs/RTOs. To address Duke’s concern, Commission Staff would consider it appropriate that the report provide narrative explanations on trends in interconnections and transmission service requests.

j. Special Protection Systems

Special Protection Systems⁴⁷ are automatic protection systems designed to detect abnormal or predetermined system conditions and take corrective actions such as changing demand, generation or system configurations in order to

⁴⁷ Special Protection Systems are also referred to as Special Protection Schemes, Remedial Action Schemes (RAS) or System Integrity Protection Schemes (SIPS).

maintain system stability, acceptable voltage levels or power flows. The metrics measure both the frequency with which the ISO/RTO relies on these systems and their effectiveness, as measured by successful activations and the number of unintended activations. Duke considers this information to be more reflective of operations of transmission owners and not ISOs/RTOs. While Commission Staff agrees that Special Protection Systems are actions undertaken by transmission owners, these actions must be coordinated with ISO/RTO operators. Accordingly, this metric is a measure of ISO/RTO-wide performance in managing system stability, voltage levels and power flows and therefore it is appropriate that this information is included in an assessment of ISO/RTO reliability performance.

k. Backup Facility

i. ISO/RTO Performance Metric

This metric measures the capability of the ISO/RTO to continue reliability operations in the event the primary control center is not functioning. The metric includes information on readiness training, communications capabilities and quick response capabilities.

ii. Comments

National Grid recommends that this information be deleted since similar NERC requirements already exist. EEI notes that this information is the same as the requirements of NERC EOP-008, and therefore its purpose is questionable. Duke asserts that NERC standards do not require that backup facilities be staffed at all times, and therefore metrics should be revised to report on whether the facility can be staffed in a short amount of time.

iii. Response

Upon further consideration, Commission Staff concludes that this information is sensitive in nature. It includes procedures and information that are critical to maintaining the integrity of the electric grid and for this reason recommends not requiring that ISOs/RTOs release this information to the public. Therefore, Commission Staff deletes this metric.

l. Market Competitiveness

i. ISO/RTO Performance Metrics

By design, the Security Constrained Economic Dispatch and Security Constrained Unit Commitment processes in ISO/RTO markets are intended to

foster competition among suppliers and to maximize production for the least-cost suppliers per least-cost unit commitment, thereby benefiting consumers. The following metrics are intended to evaluate how well ISO/RTO markets are performing in achieving competitive results:

- The first metric, the price-cost mark-up, compares the system marginal price to the system marginal cost,⁴⁸ assuming no system constraints. The difference between the marginal price and marginal cost indicates the degree of competition in ISO/RTO markets. ISO/RTO markets are more competitive the closer prices are to marginal costs. This metric is measured as the percentage mark-up for each year.
- The second metric, generator net revenue, measures the revenue that a new generator would earn above its variable production costs if it were to operate only when its variable production costs were less than the energy price. This metric can be an indicator of whether generator net revenues are sufficient to ensure new investment, if needed, and are consistent with competitive markets. This metric is measured on an annual basis.
- The third metric provides an indication of the magnitude of mitigation occurring in ISO/RTO markets, as measured by the dollars and megawatt hours mitigated, the percentage of dollars and megawatt hours mitigated and the percentage of unit hours prices are capped on an annual basis. This metric will be supplemented by a discussion of the significance of the actions for market power and competition.

ii. Comments

These metrics are endorsed by a number of commenters.⁴⁹ Public Systems and Ohio Consumer Counsel recommend a break-down of price-cost mark-up data

⁴⁸ To clarify the difference between this metric and the System Lambda metric discussed below, the price-cost mark-up compares the difference between marginal prices and marginal costs, whereas system lambda only measures marginal cost.

⁴⁹ California DWR, California PUC, DEMEC, EMCOS, EPSA, Massachusetts AG, NECPUC, NEPOOL, NRECA, New York PSC and NY Transmission Owners

by fuel type, asset class and sub-market. Ohio Consumer Counsel and OMS also recommend metrics on market concentration and market power. California PUC, California DWR and the Missouri Commission recommend metrics to measure price volatility.

iii. Response

Commission Staff will not request the break-down of price-cost mark-up data by fuel type, asset class or sub-market, as Public Systems and Ohio Consumer Counsel recommend. In ISO/RTO markets, the price that clears the market applies to all types of resources offering into the market at the price node, so there is no price applicable only to a fuel type or asset class. With respect to sub-market competition, the report should include a narrative discussion accompanying the metric that will evaluate competitive issues in sub-markets. The narrative discussion should also address market concentration and market power to the extent they have a bearing on market competitiveness, and therefore additional metrics recommended by Ohio Consumer Counsel and OMS are not needed. With respect to the price volatility measures recommended by California PUC, California DWR and the Missouri Commission, the narrative discussion should address those price movements that reflect anti-competitive behavior.

m. Market Pricing Metrics

i. ISO/RTO Performance Metrics

The four market pricing metrics measure the customer cost impact of ISO/RTO markets. The first measure, the load-weighted locational marginal price metric, measures the cost to load of energy purchased in ISO/RTO markets. The second metric, components of total power costs, breaks out each element of all costs paid by load, thereby providing a comprehensive assessment of all ISO/RTO market costs.⁵⁰ The third measure, the load-weighted, fuel-adjusted locational marginal price, is derived by holding fuel costs constant over a defined time period to show the trend of non-fuel customer costs over this period. This metric isolates the customer cost impact of cost elements such as transmission costs, congestion and losses, thereby providing a measure of the effectiveness of ISO/RTO market management. This metric also reflects the impact of load growth, investments in resources and the retirement of uneconomic facilities, and therefore it measures factors that are not entirely within the control of ISOs/RTOs. The fourth metric

⁵⁰ The cost break-down includes the following cost categories: ISO/RTO costs and regulatory fees, operating reserve costs, ancillary services costs, transmission costs, capacity costs and energy costs.

measures the impact of demand response on market prices, including impacts associated with voluntary curtailments by demand response during heat waves and other emergency conditions. All four metrics are measured on an annual basis.

ii. Comments

Certain commenters⁵¹ recommend measuring additional costs, such as the cost of reliability-must-run units, reliability unit commitment charges and payments, high voltage access charges, excess cost payments, default interest charges, lost opportunity costs and FERC annual charges. Commenters⁵² also argue for greater granularity in the reported costs and the time periods analyzed, as well as an analysis of factors driving costs. The ISO New England Market Monitor considers the fuel-adjusted metric to be of limited usefulness since there is no standard methodology to calculate the fuel-adjusted price and it is not possible to capture shifts in relative costs of fuels.

iii. Response

The cost categories covered by the total power cost metric include the major costs of ISO/RTO markets to consumers, and therefore Commission Staff considers this metric to be a comprehensive measure of the costs of ISO/RTO markets. Commission Staff believes that the narrative explanation of the causes of cost trends that accompany each ISO/RTO metrics submission will be responsive to the concerns of commenters that recommend more granularity in the cost categories, down to the level of costs for individual ISO/RTO services so that the root causes of cost trends can be better identified. The narrative discussion should also provide information on peak price trends, as requested by OMS.

Responding to commenters' interest in tracking Commission annual charges, Commission Staff considers these costs to be beyond the control of ISOs/RTOs and therefore do not reflect ISO/RTO performance. With respect to the fuel-adjusted cost metric concern raised by the ISO New England Market Monitor, Commission Staff recognizes that each ISO/RTO uses a different year as its starting point for holding fuel prices constant and the ISOs/RTOs have differing fuel mixes, making comparisons across ISOs/RTOs difficult. Nonetheless, analysis of long-term trends is a useful measure of the effectiveness of ISOs/RTOs

⁵¹ California PUC, DC Energy, Dominion, NECPUC, NEPOOL, SoCal Edison and Westar.

⁵² California PUC, ISO New England Market Monitor, New Jersey Rate Counsel and OMS.

in managing non-fuel costs, and therefore the metric will provide useful performance information.

Commission Staff notes that a fourth metric has been added to the proposed list of metrics provided in the February 3, 2010 notice to measure the impact of demand response on market prices. The purpose of this metric is to ensure the Market Pricing analysis addresses the impact of integrating demand response in ISO/RTO markets on customer costs.

n. System Lambda

System lambda is the incremental cost of energy of the marginal unit assuming no system constraints. This metric tracks the trend in marginal fuel costs and is an important metric since fuel costs represent the largest component of wholesale energy costs. APPA/ELCON recommends that this information be based on the single incremental cost of energy per FERC Form 714, rather than as a component of the locational marginal price as proposed. APPA/ELCON believes that with a correct definition, system lambda could provide useful information. Commission Staff agrees with APPA/ELCON that FERC Form 714 provides an appropriate basis for measuring system lambda, and therefore this information should be included in the report.

o. Energy Market Price Convergence

i. ISO/RTO Performance Metrics

Convergence of day-ahead and real-time energy prices provides an indication of the efficiency of ISO/RTO markets. Since the large majority of energy settlements and generator commitments occur in the day-ahead market, day-ahead price convergence with the real-time market ensures efficient day-ahead commitments that reflect real-time operating needs. Energy market price convergence is measured by the absolute value and percentage of the annual difference between real-time energy market prices and day-ahead market prices.

ii. Comment

California PUC recommends adding information on virtual bidding, market liquidity (total participants in physical and virtual trading markets) and quarterly information on energy traded and ISO/RTO costs allocated to physical trading and virtual trading in total dollars and per megawatt-hour costs.

iii. Response

Commission Staff does not consider trader capabilities and market trends that support profitable participation to be reflective of ISO/RTO market efficiency. Likewise, Commission Staff considers the bidding and trading activity of virtual traders to be based primarily on assessments by traders as to the profitability of participation as well as their financial capabilities to take advantage of market shifts. Since the ability of ISOs/RTOs to influence these factors is either non-existent or extremely limited, Commission Staff does not think it necessary to gather this information as part of an ISO/RTO performance assessment. Responding to California PUC's recommendation for quarterly data, Commission Staff considers annual information and long-term trends to be the appropriate basis to evaluate this information. Information for shorter time periods are heavily influenced by seasonal shifts and operational factors that make an evaluation of the efficiency of ISO/RTO day-ahead and real-time markets difficult. Commission Staff does not consider information on ISO costs allocated to physical and virtual trading to be appropriate, as recommended by California PUC, since it is not relevant to an evaluation of the efficiency of prices in ISO/RTO markets.

p. Congestion Management Metrics

i. ISO/RTO Performance Metrics

Congestion represents the cost to customers of paying for more expensive energy because physical transmission line limits do not allow full delivery of least-cost energy. The first congestion management metric, annual congestion costs divided by the megawatt hours of load served, tracks congestion cost trends relative to load growth thereby providing an indication of the efficiency of the overall ISO/RTO system as well as the effectiveness of ISO/RTO efforts to manage congestion costs through transmission expansion planning and other efficiency measures. This metric is also influenced by other factors, such as load trends, and as such its inputs are not entirely within the control of the ISO/RTO. The second metric, congestion revenues paid divided by congestion charges expressed as a percentage, tracks the ability of market participants to hedge these congestion costs, and thereby manage their costs.

ii. Comments

Duke considers the value of the metric to be limited because of differences in size/configuration of ISOs/RTOs. NRECA and APPA/ELCON recommend adding a metric that analyzes the costs of transmission investment and the associated value of congestion that would be relieved by such investments. The ISO New England Market Monitor notes that higher congestion costs may make sense if transmission costs are high and transmission is difficult to build. Various

commenters⁵³ recommend a number of additional and more granular metrics including metrics on day-ahead versus real-time congestion, congestion at interfaces, hedging shortfalls, changes in Narrow Constrained Areas, congestion charges at different times and FTR prices. EPSA asserts that the metric needs context in order to be meaningful and useful. APPA/ELCON endorses measuring congestion based on the difference between the maximum and minimum locational marginal price for the hour and calculated as a total, average and maximum difference for each month and year as well as the change from year to year. TAPS recommends a metric to assess whether ISOs/RTOs are enabling load-serving entities to secure long-term transmission rights for new long-term power supply arrangements. It recommends that the measures reveal the degree to which load-serving entities are being denied long-term rights for existing resources for which long-term rights were previously allocated, or to what extent load-serving entities have been unable to collect the full value of the long-term rights.

iii. Response

Commission Staff agrees with commenters that these metrics have limited usefulness in evaluating data across different ISOs/RTOs since the size and configuration of each ISO/RTO region differs, sometimes significantly, from each of the other regions. However, Commission Staff considers the trends in these metrics over time to be an indication of whether congestion management is improving in each ISO/RTO. Commission Staff agrees with commenters that the congestion cost metric will have more explanatory value if it is compared to the costs of relieving constraints. Therefore, the narrative discussions, with quantification to the extent possible, should include an analysis of the types of projects (*e.g.* transmission, generation, or demand response) and costs of relieving constraints to facilitate this comparison. The narrative explanations of trends should also address other relevant factors such as the sub-regional congestion and FTR prices recommended by commenters.⁵⁴

Commission Staff will not adopt the APPA/ELCON locational marginal price metric since the difference between the maximum and minimum locational marginal price in an ISO/RTO market reflects a number of factors unrelated to congestion, such as changes in the fuel mix, system operating conditions and load

⁵³ California DWR, ITC, National Grid, NRECA, OMS and SoCal Edison.

⁵⁴ As discussed in the transmission planning metric section, the narrative discussions should include an assessment of the impact of transmission planning on congestion trends.

shifts. The difference between maximum and minimum locational marginal price in an ISO/RTO market therefore will not reliably provide insight into ISO/RTO performance. Commission Staff believes that the hedging data, with narrative explanation, will provide TAPS with information on ISO/RTO performance with respect to providing the full value of the long-term transmission rights of load-serving entities for new and existing capacity.

q. Resource Availability Metric

i. ISO/RTO Performance Metric

Resource availability is an indication of ISO/RTO market efficiency and cost management. Generator availability, measured as the unforced⁵⁵ generator capacity available in the ISO/RTO markets, is a measure of generator responsiveness when the generator owner has indicated that the generation should be available. Higher generator availability can result in the commitment of fewer peak generators (or the importation of peak supplies) that potentially have high costs, thereby resulting in reduced costs. Demand resource availability measures the availability of demand response when called on to perform and when tested for its capability to meet capacity requirements.

ii. Comments

Some commenters⁵⁶ argue that the inputs to this metric are beyond ISO/RTO control and therefore that generator availability is not suitable as a performance metric. DC Energy proposes metrics to measure cost savings associated with improved outage statistics and more granular data on availability by unit type and years of service. California PUC endorses several metrics measuring forced outage rates and ratable time available for generators. Ohio Consumer Counsel and OMS support including generator availability information by generator type and fuel. EPSA recommends including additional information on out-of-merit dispatch and uplift payments, arguing that out-of-merit dispatch indicates the transparency and efficiency of the market and that uplift payments mask inadequate modeling by the ISO/RTO or inefficient pricing protocols. OMS and EPSA consider out-of-merit information to be a measure of the efficient daily operation of the ISO/RTO market. NEPGA supports these positions. Ohio

⁵⁵ Unforced capacity represents the capacity of a generator adjusted for planned outages.

⁵⁶ Allegheny, CAISO, Mid-American, Midwest ISO TOs, NECPUC, and NEPOOL.

Consumer Counsel recommends a metric to measure the amount of price responsive demand, by sector, that is attributed to advanced metering infrastructure.

iii. Response

While, as commenters note, generator availability is beyond the control of ISOs/RTOs, this metric is worth tracking for the following reasons: (1) it is a major factor impacting consumer costs, and therefore should be included in a comprehensive assessment of consumer costs; and (2) generator availability as measured by planned outages can be influenced by ISO/RTO incentives for greater availability, and therefore it provides an indication of the effectiveness of ISO/RTO programs. Commission Staff agrees that the cost savings information proposed by DC Energy provides useful information. This information should be included in each ISO/RTO narrative explanation since not all ISOs/RTOs have the data needed for the metric. Commission Staff will not request more granular information by unit type or age since the purpose of the metric is to measure the effectiveness of ISO/RTO programs to increase the availability of all generators. Commission Staff also does not consider metrics on forced outages and ratable time available of generation units to be appropriate, as recommended by California PUC and OMS. Such metrics measure generator activities over which ISOs/RTOs have no influence.

Responding to OMS, EPSA and NEPGA, Commission Staff considers out-of-merit dispatches to be complex events caused by a number of factors; as such, they do not measure ISO/RTO performance unless these factors can be assessed and taken into consideration. For example, if out-of-merit dispatch is required when generators cannot change output quickly enough to accommodate changes in demand over five-minute dispatch intervals, and additional, more expensive units must be committed, both generator responsiveness and performance as well as ISO/RTO coordination play a role in managing these events. At the same time, however, Commission Staff agrees with EPSA and NEPGA that these events, particularly if they are frequent and result in the commitment of many generators, can subvert the efficiency benefits of ISO/RTO markets. For this reason, narrative explanations should be included in each section of each ISO/RTO document that discuss the trends in out-of-merit dispatch and progress made toward reducing these events and improving market efficiency.

Commission Staff agrees with commenters⁵⁷ that the performance of demand response resources needs to be addressed for a comprehensive assessment of resource availability, and therefore Commission Staff supports the inclusion of information and data, where available, on demand response performance. Commission Staff agrees with the Ohio Consumer Counsel that additional information on the status of advanced meter infrastructure programs and their impact on price responsive demand availability would be appropriate in the narrative discussions. However, Commission Staff does not consider the cost measures endorsed by these commenters to be appropriate since the cost of projects do not reflect ISO/RTO market performance.

r. Fuel Diversity

This metric is defined to be the percentage mix of fuel types installed and available (capacity fuel diversity) and consumed (generation fuel diversity) in the ISO/RTO region. Fuel diversity provides an indication of the capability in an ISO/RTO market to integrate fuels with different characteristics, such as lower costs or lower environmental impacts, and how this capability compares to the fuel mix of energy consumed in ISOs/RTOs. A higher percentage consumption of low-cost fuels, compared to their capability, would indicate that Security Constrained Economic Dispatch is maximizing output of lower cost fuels. SoCal Edison recommends adding information on the total MMBtus consumed in each fuel class. Commission Staff considers the percentage break-down of fuels to be a sufficient indication of fuel diversity and therefore additional information on the physical amounts of fuel consumed is not necessary. Commission Staff recognizes that some ISOs/RTOs may be resource-constrained due to factors beyond their control such as geographic locations and environmental regulations and therefore comparisons across ISOs/RTOs may reflect factors other than performance. Commission Staff expects that such constraints would be discussed in the narrative explanations, thereby providing context for the performance results.

s. Renewables Metrics

i. ISO/RTO Performance Metrics

⁵⁷ DC Energy, Dominion, EPSA, ISO New England Market Monitor, New York PSC, Ohio PUC and Steel Producers.

Renewable resource⁵⁸ penetration in ISO/RTO markets is measured as the renewable MW share of total energy, measured in megawatt-hours, and the renewable MW share of total capacity, measured in megawatts. The renewables metrics indicate the diversity of an ISO/RTO resource mix to meet demand and capacity requirements. Greater diversity of resources can reduce consumer costs by providing more supply options and greater planning flexibility for ISOs/RTOs.

ii. Comments

Commenters⁵⁹ consider the metric to be beyond ISO/RTO control and therefore not suitable as a performance metric. NESCOE notes that the metric is developed within the states' energy and environmental planning and policy frameworks. EEI and NEPOOL assert that the metric is not meaningful since there are differences in resource mix, fuel prices, congestion, renewable penetration and capacity factor in each ISO/RTO. AWEA recommends a number of metrics to measure the time and planning process steps required to integrate wind resources onto ISO/RTO systems. OMS endorses capacity factor metrics.

The ISO New England Market Monitor and EPSA recommend metrics to measure the operating performance of renewable resources and measurement of the payments made to these resources. Ohio Consumer Counsel endorses metrics on the costs of renewable interconnections and events during which renewable resources were backed down. Ohio Consumer Counsel also recommends a metric to record the amount of behind-the-meter distributed generation (renewable and combined heat and power) and the share of distributed generation in ISO/RTO energy and capacity markets.

iii. Response

Commission Staff recognizes that the amount of renewable resources in a market is not under the direct control of ISOs/RTOs, and that they are influenced by a number of factors, such as state renewable initiatives. Nonetheless, the metrics may be a useful indicator of the integration of renewable resources into the ISO/RTO markets. Commission Staff recognizes that regional differences among the ISOs/RTOs will result in differing penetration results for renewable resources.

⁵⁸ Renewable resources are defined to be variable energy resources, including solar, wind, hydro, geothermal and biomass resources.

⁵⁹ Allegheny, Midwest ISO TOs, and NESCOE.

Commission Staff agrees with commenters that additional information should be provided and quantified to the extent possible, to the extent it is available. For this reason, Commission Staff is adding the renewables percentage of capacity as a metric to the list of proposed metrics issued on February 3, 2010. Additional information would also be appropriate in narrative explanations that address the specific market products being provided by these resources and the most significant aspects of their participation including the status of interconnecting major renewable resources, as recommended by AWEA and Ohio Consumer Counsel, the frequency of events in which renewable resources were backed down, as recommended by Ohio Consumer Counsel and information on capacity factors as recommended by OMS. Commission Staff does not consider operating performance and cost measures for these resources to be appropriate since the operating performance and the cost of the projects do not measure ISO/RTO performance.

t. Administrative Costs Metrics

i. ISO/RTO Performance Metrics

The administrative cost metrics measure the ability of ISOs/RTOs to keep costs within budgeted levels (actual versus budgeted administrative charges metric) and to manage the growth rate of administrative costs commensurate with the growth rate of system load (administrative charges cents per megawatt-hour of load served metric). The components of ISO/RTO administrative costs are capital costs – capital charges, debt service, interest expense and depreciation expense – and operating and maintenance costs net of miscellaneous income. By managing administrative costs, ISOs/RTOs can reduce customer costs.

ii. Comments

The New Jersey Rate Counsel notes that since costs are not directly comparable across ISOs/RTOs due to differences in size, function and capacity mix, ISO/RTO administrative cost metrics must be defined on a disaggregated basis.⁶⁰ The Midwest ISO states that total administrative charges are most closely related to the geographic scope and load size of each ISO/RTO and that this figure would not be an appropriate mechanism for comparing ISO/RTO performance when there is such a wide variation in geographic scope and load size of the jurisdictional ISO/RTO. The Midwest ISO also notes that the metric fails to account for the different sets of services offered by each ISO/RTO to their

⁶⁰ Ohio Consumer Counsel also supports a breakdown of major categories of administrative costs as well as weather-normalized data.

members. OMS supports comparing actual and budgeted administrative charges with a break-down by category of costs. California DWR recommends a comparison of administrative and operating costs over time to determine streamlining and duplication in transmission operational and administrative costs between ISO/RTO and transmission owners.

The Federal Trade Commission endorses an internal operating efficiency metric that holds ISOs/RTOs accountable for making cost-effective use of resources such as staff and software to run the grid efficiently. DC Energy also supports a metric that measures whether administrative costs are justified by the projects undertaken.

TANC recommends that the Commission strengthen its oversight of the ISO/RTO budgeting process and makes the specific recommendation that ISOs/RTOs be required to submit their proposed budgets for Commission approval and explain any deviations, such as is required for NERC and the Regional Entities. ODEC asserts there is need for increased transparency in the budget process. OMS expresses concern that the stakeholder process for budget reviews requires considerable resources and does not allow for meaningful participation for some important stakeholders.

iii. Response

Commission Staff recognizes that administrative costs will vary by ISO/RTO and that comparisons between ISOs/RTOs may not be meaningful, as commenters point out. Commission Staff expects that the primary value of this metric will be in the analysis of long-term cost trends and the narrative explanations of major variances from budget and that this information will be responsive to the concerns of commenters. The narrative discussions should include discussions of major categories of costs⁶¹ as part of the variance analysis, thereby addressing recommendations of commenters. Also, the narrative discussions should address the cost-effectiveness of ISO/RTO administrative resource planning, as recommended by the Federal Trade Commission. Further, the narrative discussion could explain the effect that load reductions (due to demand resources, energy efficiency, or other factors) have had on reducing Mwhts, and thus the calculation of the second metric, so that these effects do not convey the misimpression that administrative costs per Mwh have increased.

⁶¹ We clarify for California PUC and Ohio Consumer Counsel that the administrative charges include capital investment.

Commission Staff does not recommend a mandatory budgeting process. As discussed in the opening sections of this working paper, this is not a rulemaking proceeding and therefore mandatory requirements are not appropriate.

u. Customer Satisfaction Metric

i. ISO/RTO Performance Metrics

The percentage of satisfied members metric and the independent assessment of customer satisfaction provide indications of the extent to which ISOs/RTOs provide value to their customers. The independent assessments of customer satisfaction are based on surveys undertaken by independent, third-party entities. These surveys analyze customer perspectives on a wide range of ISO/RTO activities.

ii. Comments

The Federal Trade Commission endorses a metric to measure responsiveness to grid users and the retail customers they serve. California DWR recommends an independent assessment of customer satisfaction with ISO/RTO performance and customer friendliness. NEPUC and NEPOOL recommend that satisfaction should be measured for separate functions; transmission planning, setting of installed capacity requirements, administration of market, market rule changes, market settlement, market development, and responsiveness to information requests. New Jersey Rate Counsel recommends assessing customer satisfaction by major functional area (e.g., operations, transmission planning, generation planning) and by customer group. Ohio Consumer Counsel supports assessing customer satisfaction by sector and Massachusetts AG recommends that information be provided on customer complaints broken down by topic area with the corresponding ISO/RTO response.

Several comments also recommend additional metrics. NY Transmission Owners recommend a metric to measure ISO/RTOs' correct implementation of tariffs and avoidance of market errors. National Grid endorses a metric to measure the frequency of price flagging and tariff waiver requests by ISOs/RTOs. DC Energy recommends a metric to measure the frequency with which market reports are posted in a timely manner. NEPOOL endorses a metric to measure the responsiveness of ISOs/RTOs to participant or consumer requests for cost impact analyses and analyses of market rule revisions. ODEC has a similar recommendation for responsiveness per the requirements of Order No. 719.⁶²

⁶² *Wholesale Competition in Regions with Organized Energy Markets*, Order No. 719, 73 Fed. Reg. 64,100 (Oct. 28, 2008), FERC Stats. & Regs. ¶ 31,281 (2008).

NEPGA supports a metric to measure buyer and seller stakeholder support for ISO/RTO market rule changes.

iii. Response

In response to comments, Commission Staff considers it appropriate to include information in the report from independent assessments of customer satisfaction and satisfaction surveys of specific ISO/RTO functions. The Customer Satisfaction Metric will be supplemented by a narrative discussion that should address responses by customer sector and by functional area as well as referencing key customer activities such as responsiveness to customer requests, the timeliness of market reports, time to resolve invoice disputes, correct implementation of tariffs, market errors/price flagging and stakeholder support for major rule changes, as recommended by commenters.

v. Billing Controls Metric

This metric indicates the accuracy and integrity of the ISO/RTO billing process, based on audits conducted according to the Statement on Auditing Standards No. 70 guidelines set by the American Institute of Certified Public Accountants. The audits describe the controls, the results of testing of the ISO/RTO controls, whether the controls were designed to achieve the control objectives, the auditor's opinions on the audit and whether the controls that were tested were operating with sufficient effectiveness to provide reasonable assurance that the control objectives were achieved. NY Transmission Owners and Allegheny recommend metrics to measure billing errors. Commission Staff considers it appropriate that the narrative explanation that accompanies this metric include a discussion of major billing issues, including billing errors, rather than reporting an error metric. Such an explanation should provide a more meaningful assessment of the significant billing issues that may be the root cause of billing errors.

IV. APPENDIX A

LIST OF INTERVENORS AND COMMENTERS

- Allegheny Power and Allegheny Energy Supply Company, LLC (Allegheny)
- American Public Power Association and Electricity Consumers Resource Council (APPA/ELCON)
- American Wind Energy Association (AWEA)
- California Department of Water Resources State Water Project (California DWR)
- California Independent System Operator Corporation (CAISO)
- California Public Utilities Commission (California PUC)
- City of Redding, City of Santa Clara and M-S-R Public Power Agency (Cities/M-S-R)
- COMPETE Coalition (COMPETE)
- Consumer Commenters⁶³ (Consumer Coalition)
- DC Energy, LLC (DC Energy)
- Delaware Municipal Electric Corporation (DEMEC)
- Dominion Resources Services, Inc. (Dominion)
- Duke Energy Corporation (Duke)
- Edison Electric Institute (EEI)
- Eastern Massachusetts Consumer-Owned Systems (EMCOS)
- Electric Power Supply Association (EPSA)

⁶³ AARP, American Forest & Paper Association, American Municipal Power, Inc., American Public Power Association, Blue Ridge Power Agency, Citizen Power, Citizens Utility Board, Coalition of Midwest Transmission Customers, Connecticut Office of Consumer Counsel, Delaware Municipal Electric Corporation, Inc., Electricity Consumers Resource Council, Illinois Attorney General, Industrial Energy Consumers of America, Kennebunk Light & Power, Maryland Office of People’s Counsel, Modesto Irrigation District, Municipal Electric Utilities Association of New York, National Consumer Law Center, NEPOOL Industrial Customer Coalition, New England Public Power Association, New York Association of Public Power, Office of the People’s Counsel for the District of Columbia, Ohio Partners for Affordable Energy, Pennsylvania Office of Consumer Advocate, PJM Industrial Customer Coalition, Public Citizen, Public Power Association of New Jersey, Public Utility Law Project of New York, Inc., and Virginia Citizens Consumer Council.

- Federal Trade Commission (Federal Trade Commission)
- FirstEnergy Service Company (FirstEnergy)
- Coalition of Midwest Transmission Customers and PJM Industrial Customer Coalition (Industrial Customers)
- Internal Market Monitor of ISO New England Inc. (ISO New England Market Monitor)
- ISO/RTO Council (IRC)
- Independent Power Producers of New York, Inc., (IPPNY)
- International Transmission Company (ITC)
- Maine Public Utilities Commission (Maine Commission)
- Public Service Commission of Maryland (Maryland PSC)
- Attorney General of the Commonwealth of Massachusetts (Massachusetts AG)
- MidAmerican Energy Company (MidAmerican)
- Midwest Independent Transmission System Operator, Inc. (Midwest ISO)
- Midwest ISO Transmission Owners (Midwest ISO TOs)
- Missouri Public Service Commission (Missouri Commission)
- Modesto Irrigation District (MID)
- National Association of Regulatory Utility Commissioners (NARUC)
- National Grid USA (National Grid)
- National Rural Electric Cooperative Association (NRECA)
- New England Conference of Public Utility Commissions (NECPUC)
- New England Power Generators Association, Inc. (NEPGA)
- New England Power Pool Participants Committee (NEPOOL)
- New England States Committee on Electricity (NESCOE)
- New Jersey Division of Public Advocate, Division of Rate Counsel (New Jersey Rate Counsel)
- New Hampshire Public Utilities Commission (New Hampshire PUC)
- New York State Public Service Commission (New York PSC)
- Indicated New York Transmission Owners (NY Transmission Owners)
- Public Utilities Commission of Ohio (Ohio PUC)
- Office of the Ohio Consumers' Counsel (Ohio Consumer Counsel)
- Old Dominion Electric Cooperative (ODEC)
- Organization of MISO States (OMS)
- Pacific Gas and Electric Company (PG&E)
- Pennsylvania Public Utilities Commission (Pennsylvania PUC)
- Pepco Holdings, Inc. (PHI Companies)
- PJM Power Providers Group (P3)
- Connecticut Municipal Electric Energy Cooperative, Massachusetts Municipal Wholesale Electric Company and New Hampshire Electric Cooperative (Public Systems)

- Retail Energy Supply Association (RESA)
- Southern California Edison Company (SoCal Edison)
- Steel Producers Association (Steel Producers)
- Transmission Association of Northern California (TANC)
- Transmission Access Policy Study Group (TAPS)
- Tyrone Christy, Vice Chairman, Pennsylvania Public Utilities Commission (Commissioner Christy)
- United Illuminating Company (United Illuminating)
- Viridity Energy, Inc. (Viridity)
- Westar Energy Inc. (Westar)

V. APPENDIX B

| Performance Metric | Specific Metric(s) |
|--------------------|--|
| Reliability | |
| A. | <p data-bbox="226 321 527 435">National or Regional Reliability Standards Compliance</p> <ol data-bbox="615 321 1885 727" style="list-style-type: none"> 1. References to which Electricity Reliability Organization (ERO) and Regional Reliability Organization (RRO) standards are applicable to each ISO/RTO 2. Number of violations self-reported 3. Number of violations identified as RRO or ERO audit findings 4. Total number of violations 5. Severity level of each violation 6. Compliance with operating reserve standards 7. Unserved energy (or load shedding) caused by violations |
| B. | <p data-bbox="226 755 512 787">Dispatch Reliability</p> <ol data-bbox="615 755 1913 938" style="list-style-type: none"> 1. Balance Authority Ace Limit (BAAL) OR// CPS1 and CPS2 2. Number of hours of transmission load reliefs (of severity level 3 or higher) or unscheduled flows 3. Energy Management System (EMS) availability |
| C. | <p data-bbox="226 966 569 1031">Operational Planning – Load Forecast Accuracy</p> <p data-bbox="615 966 1843 1031">Actual load as a percentage variance from forecasted load (separate metrics for peak and valley metric)</p> |
| D. | <p data-bbox="226 1063 485 1128">Wind Forecasting Accuracy</p> <p data-bbox="615 1063 1524 1096">Actual wind availability compared to forecasted wind availability</p> |
| E. | <p data-bbox="226 1144 512 1177">Unscheduled Flows</p> <p data-bbox="615 1144 1906 1258">Difference between net actual interchange (actual measured power flow in real time) and the net scheduled interchange in megawatt hours (total system and major interfaces) and as a percentage of total flows</p> |
| F. | <p data-bbox="226 1279 533 1344">Transmission Outage Coordination</p> <ol data-bbox="615 1279 1934 1399" style="list-style-type: none"> 1. Percentage of $\geq 200\text{kV}$ planned outages of 5 days or more that are submitted to ISO/RTO at least 1 month prior to the outage commencement date 2. Percentage of planned outages studied in the respective ISO/RTO Tariff/Manual |

| Performance Metric | | Specific Metric(s) |
|--------------------|--|---|
| | | <p>established timeframes</p> <p>3. Percentage of ≥ 200 kV outages cancelled by ISO/RTO after having been previously approval</p> <p>4. Percentage of ≥ 200kV outages (both planned and unplanned) with less than 2 days notice</p> |
| G. | Long-Term Reliability Planning – Transmission | <p>1. Number of facilities approved to be constructed for reliability purposes</p> <p>2. Percentage of approved construction on schedule and completed</p> <p>3. Performance of Order 890 planning process related to:</p> <ul style="list-style-type: none"> a. Completion of reliability studies b. Completion of economic studies <p>4. Impact of Demand Response on Infrastructure Investment</p> |
| H. | Long-Term Reliability Planning – Resources | <p>1. Processing time for generation interconnection requests</p> <p>2. Actual reserve margins compared with planned reserve margins</p> <p>3. Demand response megawatts as percentage of total capacity</p> <p>4. Percentage of generation outages cancelled by ISOs/RTOs</p> <p>5. Number and capacity of generation reliability must run contracts</p> <p>6. Demand response megawatts as percentage of total ancillary services</p> |
| I. | Infrastructure Investment – Interconnection and Transmission Process Metrics | <p>1. Number of requests</p> <p>2. Number of studies completed</p> <p>3. Average age of incomplete studies</p> <p>4. Average time for completed studies</p> <p>5. Average cost of each type of study completed (e.g., feasibility study, system impact study and facility study)</p> |

| Performance Metric | | Specific Metric(s) |
|--------------------|----------------------------|---|
| J. | Special Protection Systems | <ol style="list-style-type: none"> 1. Number of special protection systems 2. Percentage of special protection systems that responded as designed when activated 3. Number of unintended activations |

| Performance Metric | | Specific Metric(s) |
|------------------------|---------------------------------|--|
| Market Benefits | | |
| A. | Market Competitiveness | <ol style="list-style-type: none"> 1. Price Cost Mark Up 2. Generation Net Revenues 3. Percentage of hours offers are capped due to mitigation |
| B. | Market Pricing | <ol style="list-style-type: none"> 1. Load-Weighted Locational Marginal Prices 2. Components of Total Power Costs based on Load-Weighted Locational Marginal Prices (e.g. fuel costs, transmission charges, RTO costs, etc.) 3. Load-Weighted, Fuel-Adjusted Locational Marginal Prices 4. Impacts of Demand Response on Market Prices |
| C. | System Lambda | System Lambda (on marginal unit); unconstrained energy portion of system marginal cost |
| D. | Energy Market Price Convergence | <ol style="list-style-type: none"> 1. Absolute dollar difference between day-ahead and real-time prices 2. Percentage difference between day-ahead and real-time prices |
| E. | Congestion Management | <ol style="list-style-type: none"> 1. Congestion charges per megawatt hour of load served 2. Percentage of congestion dollars hedged through ISO/RTO-administered congestion management markets |
| F. | Resource Availability | <ol style="list-style-type: none"> 1. 1 – RTO forced outage rate 2. Demand Response Availability |
| G. | Fuel Diversity | Fuel diversity in terms of energy, installed capacity and actual production |

| Performance Metric | | Specific Metric(s) |
|-------------------------------------|-----------------------|--|
| H. | Renewables | <ol style="list-style-type: none"> 1. Renewable megawatt hours as a percentage of total energy 2. Renewable megawatts as a percentage of total capacity. |
| Organizational Effectiveness | | |
| A. | Administrative Costs | <ol style="list-style-type: none"> 1. Annual actual ISO/RTO administrative charges to members compared with budgeted administrative charges 2. Annual actual ISO/RTO administrative charges to members as cents per megawatt hour of load served |
| B. | Customer Satisfaction | <ol style="list-style-type: none"> 1. Percentage of satisfied stakeholders 2. Independent assessment of stakeholder satisfaction |
| C. | Billing Controls | SAS 70 audit scope (e.g. Type 1 or Type 2 audit) and results |