The purpose of this User Guide is to provide instructions and additional clarification for respondents to complete the Input Spreadsheet as part of the Common Metrics Information Collection (FERC-922, OMB Control No. 1902-0262, Expiration Date: to be determined). Please read these instructions in their entirety before completing the Information Collection. The instructions are organized as follows:

Contents

For any clarifications or for more guidance, please contact Commission staff at: MetricsDL@ferc.gov

I. Submission Deadline

The deadline for sending a response to the Information Collection to the Federal Energy Regulatory Commission (FERC, or the Commission): XX Month 20XX

The associated Input Spreadsheet (FINAL FILE NAME HERE) should be filed

electronically through the Commission website. Instructions for electronic filing can be found at this link: https://www.ferc.gov/docs-filing/efiling.asp.

II. Authorization

This Information Collection is authorized in compliance with the requirements of the Paperwork Reduction Act of 1995, 44 U.S.C. § 3506(c)(2)(A), by the Office of Management and Budget under Control No. 1902-0262. The authorization for the Information Collection expires [To Be Determined Contingent on OMB Approval]. The Commission has reinstated and revised this Information Collection under the title FERC-922, Performance Metrics for ISOs, RTOs and Regions Outside ISOs and RTOs.

III. Intended Audience: Who Should Answer the Information Collection Request?

Completion of this Information Collection is voluntary, but the Commission encourages participation by each of the six jurisdictional Regional Transmission Operators/Independent System Operators (RTOs/ISOs), and by any non-jurisdictional RTO/ISO or individual utilities in non-RTO/ISO regions that choose to submit responses. The jurisdictional RTO/ISO entities are: ISO New England Inc. (ISO-NE); New York Independent System Operator (NYISO); PJM Interconnection, L.L.C. (PJM); Midcontinent Independent System Operator, Inc. (MISO); Southwest Power Pool, Inc. (SPP); and California Independent System Operator Corporation (CAISO). The non-jurisdictional RTOs/ISOs include the Electric Reliability Council of Texas, Alberta Electric System Operator, and the Independent Electricity System Operator (Ontario). For purposes of this Information Collection the term "non-RTO/ISO utility" means any investor-owned utility (IOU), any municipal or cooperative, or any federal government-owned utility.

IV. Structure of the Information Collection

A. General Information

The Information Collection consists of this User Guide and an Input Spreadsheet, which includes (i) an instructions worksheet followed by (ii) twenty-nine data worksheets, one for each metric. In order to complete the Information Collection, respondents must input data into the applicable cells of the data worksheets. Both the User Guide and the Input Spreadsheet can be found in eLibrary in Docket No. AD19-16-000.

The burden for the FERC-922 is estimated to average 401 hours per response, including

the time for reviewing instructions, searching existing data sources, gathering and maintaining the data, and completing and reviewing the collection of information.

B. Where to Send Comments on Public Reporting Burden

Send comments regarding the burden estimate or any aspect of the collection of information, including suggestions for reducing burden, to the Federal Energy Regulatory Commission, 888 First Street NE, Washington, DC 20426 (Attention: Information Clearance Officer); and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503 (Attention: Desk Officer for the Federal Energy Regulatory Commission). No person shall be subject to any penalty for failing to comply with a collection of information that does not display a valid control number (44 U.S.C. § 3512(a)).

C. The Instructions Worksheet

The instructions worksheet, which is the first tab of the Input Spreadsheet, provides information about the three groups of metrics, and contains cells for respondents to input data relevant across all of the subsequent metrics.

D. The Data Worksheets

Each data worksheet has the same format, which consists of header information and data element information as described below.

1. Header Information

The **balancing authority area respondent name** identifies the respondent completing the Information Collection. The name can be entered once in the instructions worksheet and then will automatically copy to all subsequent data worksheets. See the Entering Contact Information section below for more information.

The **group number**, which references the group within which each metric is categorized, appears in each data worksheet in the third row, along with the metric number and metric name. The groups are identified by color. More information about groups can be found in the Three Types of Metrics and Three Groups of Respondents section below and in the instructions worksheet.

Equations for certain metrics, where appropriate, will also appear in select data worksheets. These equations describe how to calculate the individual metric(s).

The five **reporting periods** are provided as column headers at the top of the table in each data worksheet. Reporting periods are explained below in the Reporting Period section.

2. Data Element Information

Each data worksheet, which features an individual metric, contains corresponding data elements to assist respondents in providing standardized data inputs for each metric. The individual data elements are consecutively numbered (e.g., 1.00, 1.01, 1.02) in column A.[1]

Column B can contain different types of text depending on the granularity of the data element. This column can contain either a brief description of the data element; an equation on how to arithmetically calculate the individual metric; or a title (in **bold**) of the data element with a detailed text description.

3. Other Worksheet Information

Each data worksheet tab identifies the metric by an integer and a brief textual description (e.g., #1 Reserve Margins, #2 Heat Rates).

Some data worksheets contain formulas that copy data from a previous data worksheet or perform calculations on data provided within that data worksheet. Respondents should not enter data into these cells, as they are self-populating. These cells are identified in two ways:

- The cells are labeled as either "*Automatically calculated*" or "*Automatically copied from...*" in the column B description for that data element; and
- The data entry cells in rows with automatic calculations are shaded gray.

E. Three Types of Metrics and Three Groups of Respondents

The metrics are separated into three groups based on their applicability to respondents. The three groups are:

Group 1: Administrative and Descriptive Metrics

- All RTOs/ISOs and non-RTO/ISO utilities should complete this group of

[1] When referenced below, these data elements will be designated in parenthesis and correspond to the Input Spreadsheet.

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metrics.

- This group includes Metric #1 through Metric #7.
- Non-RTO/ISO utilities should complete this group of metrics with data that correspond to the individual balancing authority areas in which they operate. Non-RTO/ISO utilities that operate in more than one balancing authority area should submit a separate Input Spreadsheet for each balancing authority area in which they operate.
- Worksheets for this group of metrics are identified with a yellow tab.

Group 2: Energy Market Metrics

- All RTOs/ISOs should complete this group of metrics.
- This group of metrics includes Metric #8 through Metric #19.
- Worksheets for this group of metrics are identified with a green tab.

Group 3: Capacity Market Metrics

- All RTOs/ISOs that operate centralized capacity markets should complete this group of metrics.
- This group of metrics includes Metric #20 through Metric #29.
- This group of metrics may require detailed information that should be reported at the zonal level, or sub-RTO/ISO level, where applicable.
- Instructions on adding additional rows to a worksheet in order to accommodate additional zones are explained in Appendix A.
- Worksheets for this group of metrics are identified with a blue tab.

V. How to Complete the Information Collection

A. General Directions

This section explains the reporting period and describes how to: (1) complete the Information Collection; (2) enter contact information; (3) format data entry for each data element; and (4) modify the data worksheets to accommodate additional zonal information. In order for the Information Collection process to work efficiently, respondents should adhere to the following practices.

1. Data Worksheet

- **Respondents should only use the pre-formatted Input Spreadsheet provided in eLibrary to submit responses.**

- Before completing a data worksheet, respondents should read the definitions, explanations, and instructions for the metric associated with that data worksheet in this User Guide. It may be helpful to have a copy of the User Guide nearby when completing the Input Spreadsheet.

- Respondents should not use previous versions of the Input Spreadsheet, or use other spreadsheet formats, because the Commission will not be able to process responses if they arrive in a different format.

- Respondents should populate the data elements in the table of each data worksheet in numerically consecutive order, as the outputs for some data elements depend on the inputs provided from prior data elements. For instance, there are many calculations embedded within cells that will automatically calculate percentages based on data elements entered previously in that data worksheet.

- Respondents should not add or delete any data worksheets within the Input Spreadsheet.

- Respondents should not rename the data worksheet tabs.

- Respondents should follow the directions in Appendix A when adding rows for additional capacity zones.

- If possible, respondents should complete the Input Spreadsheet using a computer with a Windows operating system. The Input Spreadsheet contains embedded

macros, which may not operate as desired on another operating system, such as Mac or UNIX. Respondents should contact Commission staff if they do not have a Windows operating system, so that staff can provide further guidance.

- RTOs/ISOs should submit one completed Input Spreadsheet. Similarly, a non-RTO/ISO utility with one balancing authority area should submit only one completed Input Spreadsheet. Utilities operating multiple balancing authority areas outside of RTOs/ISOs should submit multiple completed Input Spreadsheets, one for each balancing authority area.

2. Data Entry Format

- Respondents should enter all dollar values or costs in nominal dollars (e.g., dollar values as they were recorded in that reporting period, not adjusted for inflation or referenced to a common base year, unless otherwise directed in a particular question).

- Respondents should report megawatt (MW) values rounded to whole numbers (i.e., no decimal points or commas), unless explicitly instructed to report otherwise.

- Respondents should indicate negative amounts by using a minus sign (-) before the number, or by placing parentheses () around the values. Note that some cells may automatically convert negative values with minus signs into values within parentheses.

- Respondents should report dates in the format requested, and most are in the Month-Year (MM-YYYY) format.

- If the metric calls for explanatory text (e.g., "Report any relevant information about this event as necessary"), respondents should enter a brief description in the appropriate cell. The purpose of this explanatory text is to allow respondents to provide a brief commentary on the number or value provided by the respondent to explain (1) unique situations, (2) assumptions on the calculations or underlying data, (3) uniqueness of the RTO/ISO or non-RTO/ISO utility, or (4) general information that should be captured. This information is helpful as contextual support for the final report that is issued.

B. Entering Contact Information

Respondents should input the following contact information in the instructions worksheet:

- **Balancing Authority Area Name.** Respondents should enter the full name of their balancing authority area. There is existing text stating "Example: PJM, ISO-NE, etc."—simply type over this entry. This contact information will automatically copy to each subsequent worksheet.

- **Name of the Contact Person.** Respondents should enter the full name of the person that Commission staff should contact if there are questions concerning data submission. There is existing text stating "John Doe" in this cell—simply type over this entry.

- **Phone Number of the Contact Person.** Respondents should enter the phone number of the person that Commission staff should contact if there are questions concerning data submission. There is existing text stating "202-111-1234" in this cell—simply type over this entry.

- **Email address of the Contact Person.** Respondents should enter the email address of the person that Commission staff should contact if there are questions concerning data submission. There is existing text stating "john.doe@BAA.org" in this cell—simply type over this entry.

C. Reporting Period

There are five separate columns designating the reporting period in each data worksheet, one for each of the five reporting periods of the Information Collection. The reporting periods generally cover the calendar years from 2014 to 2018; however, there are two types of reporting periods: (i) a planning/delivery year, based on whether or not there is a centralized capacity market, or (ii) calendar year for all others.

For respondents without centralized capacity markets, both RTOs/ISOs and non-RTO/ISO utilities, the reporting period is the first calendar year of the five reporting periods. Respondents should enter a four digit year in the first reporting period cell in the instructions worksheet.

For RTOs/ISOs with centralized capacity markets, the label used for each reporting period is the year of the start of the delivery period. For instance, PJM's capacity market

has a delivery period beginning in June and running until the end of May in the following calendar year. Therefore, the beginning of this delivery period for June 2014 to May 2015 is June 2014 and PJM should enter "2014" for the four digits of the "delivery period" in the instruction worksheet. For the remainder of the metrics, unless otherwise noted, the data that PJM would use would be based on the value of the input variables underlying the most recent auction for the delivery period. Similarly, for all other submissions from respondents with centralized capacity markets, data would be based on the twelve months comprising the delivery period for the specific RTO/ISO.[2]

D. Entering Zonal Data

Some metrics may allow respondents to enter data for specific zones. For instance, RTOs/ISOs that operate a central capacity market may have multiple capacity zones in a reporting period.

Each data worksheet requiring zonal information contains a template for entering such information. Some metrics require information on an RTO/ISO-wide basis and for individual zones. If there are multiple zones within a respondent's balancing authority area, respondents should click the "Add zone" button for adding templates, which is described in Appendix A.

If the name of a zone has changed over the course of the reporting period associated with this Information Collection, the respondent should add a new template for each distinct name, submitting data for the reporting period in which the zone name is active. If a zone has split into two or more zones, the respondent should add a new template for each zone name, submitting data for the reporting period in which the zone name is active. If zonal boundaries have changed within the five reporting periods, respondents should provide a brief qualitative description in the explanatory text.

Further instruction on entering zonal data is provided in Appendix A.

VI. Metrics

The data worksheets contain instructions or descriptive text to assist respondents in submitting the data elements for each of the metrics. Additional information is provided below to supplement the information provided in the Input Spreadsheet. The additional

[2] NYISO has two consecutive six-month delivery periods which should be concatenated to create a twelve-month delivery period.

information could be a link to an external source or supplementary explanation not provided in the Input Spreadsheet.

Metric # 1. Reserve Margins

The anticipated reserve margin metric is designed to measure the amount of generation capacity available to meet expected demand.[3] Sufficient reserves ensure that there is a low probability of loss-of-load due to inadequate supply. The actual reserve margins measure the realized amount of reserves within the reporting period. The comparison of the actual reserve margin to the anticipated reserve margin measures the extent to which generation resource planning processes are ensuring long-term resource adequacy and reliability.

RTOs/ISOs with centralized capacity markets should use the values determined in the capacity auction of the reporting period for data elements such as Forecasted Peak Demand and Total Anticipated Installed Capacity.

Non-RTO/ISO utilities and RTOs/ISOs without capacity markets should use the value from the Integrated Resource Plan, Resource Adequacy Plan, etc., or other appropriate planning process for data elements such as Forecasted Peak Demand and Total Anticipated Installed Capacity.

Metric # 2. Average Heat Rates

A heat rate measures the efficiency of a resource to convert thermal power into electric power. A heat rate can be calculated as the quotient of the thermal power input divided by electric power produced. Trends in aggregate heat rates across technologies may indicate changes in the efficiency of fuel consumption.

The equation at the top of the data worksheet describes the calculation of average heat rates over five technology types (oil-fired steam, natural-gas fired steam, coal-fired generation, combustion turbines, and combined cycles) based on their installed capacity of the balancing authority area.

For all dual-fueled units, respondents should calculate the average heat rate as if the unit only used the primary fuel.

[3] N. Am. Electric Reliability Corp., *M-1 Reserve Margin* (2017), https://www.nerc.com/pa/RAPA/ri/Pages/PlanningReserveMargin.aspx.

Respondents should use the fuel and generation output data from Energy Information Administration (EIA) Form 923 to calculate this metric.

Metric # 3. Fuel Diversity

The fuel diversity metric represents the different amounts of installed generating capacity and the different quantities of energy produced by various technology types. Respondents should provide the summer capacity rating (MW) defined by the EIA and the net energy generated in Megawatt-hours (MWh) by the listed fuel types. There are two recommended sources for respondents to map fuel codes to the requested fuel codes in Metric #3.

1. S&P Global Market Intelligence uses the 10 fuel codes listed in the worksheet.[4]

2. EIA collects data by summer capacity in EIA Form 860.[5] EIA collects data on energy produced in EIA Form 923.[6] Each EIA form requires that data be collected under an EIA fuel code. Those codes are reproduced in Appendix B, mapped to the ten requested fuel codes in the worksheet.

Net energy should be reported from the resource's metered generation.

Net summer capacity represents the maximum output, commonly expressed in megawatts (MW), that generating equipment can supply to system load, as demonstrated by a multi-hour test, at the time of summer peak demand (period of June 1 through September 30). This output reflects a reduction in capacity due to electricity use for station service or auxiliaries.[7]

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[4] Summer capacity values for these fuel codes can be found at https://www.snl.com/web/client?auth=inherit#industry/historicalFutureCapacity. Energy produced by these fuel codes can be found at https://www.snl.com/web/client?auth=inherit#industry/monthlyGeneration.

[5] *See* U.S. Energy Info. Admin., *Form EIA-860 Detailed Data With Previous Form Data* (2019), https://www.eia.gov/electricity/data/eia860/ (see spreadsheet 3_1_GeneratorYyyyy).

[6] *See* U.S. Energy Info. Admin., *Form EIA-923 Detailed Data With Previous Form Data* (2019), https://www.eia.gov/electricity/data/eia923/.

[7] For more information see https://www.eia.gov/tools/glossary/index.php?id=net

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Metric # 4. Capacity Factor by Technology Type

The capacity factor metric measures the actual energy produced at a generation station as a fraction of the maximum possible energy that could have been produced if it were operating at full capacity 24 hours a day, 365 days a year. This metric aggregates generator output by generation technology types and provides insight into changes in the utilization rate of generation technology types.

The capacity factor is a percentage displayed in decimal terms. Generally, a given capacity factor will range between zero and one, and the spreadsheet will display value with up to two decimal places. A capacity factor of 0.89, for example, would indicate capacity factor of eighty-nine percent.

Metric # 5. Energy Emergency Alerts (EEA Level 1 or Higher)

The energy emergency metric provides information on the frequency of energy emergencies. For the purposes of this Information Collection, respondents should report the number of Energy Emergency Alerts (EEA) Level 1 or Higher in each reporting period.[8]

An overview of the three levels of EEA is provided below:

1. **EEA Level 1 — All available resources in use.**

   Circumstances:

   - The balancing authority is experiencing conditions where all available generation resources are committed to meet firm load, firm transactions, and reserve commitments, and is concerned about sustaining its required contingency reserves.
   - Non-firm wholesale energy sales (other than those that are recallable to meet reserve requirements) have been curtailed.

2. **EEA Level 2 — Load management procedures in effect.**

%20summer%20capacity.

[8] Information on EEAs is available at https://www.nerc.com/pa/rrm/ea/Pages/Energy-Emergency-Alerts.aspx.

Circumstances:

- The balancing authority is no longer able to provide its expected energy requirements and is an energy deficient balancing authority.
- An energy deficient balancing authority has implemented its operating plan(s) to mitigate emergencies.
- An energy deficient balancing authority is still able to maintain minimum contingency reserve requirements.

3. **EEA Level 3 — Firm load interruption is imminent or in progress.**

Circumstances:

- The energy deficient balancing authority is unable to meet minimum contingency reserve requirements.[9]

Metric # 6. Performance by Technology Type during EEA Level 1 or Higher

The performance by technology type under the shortage metric provides information on aggregate performance of technologies during EEA Level 1 or higher alerts by measuring the total five-minute intervals when an alert is present and how the generators, by technology type, performed. The equation at the top of the worksheet describes this calculation in more detail.

Metric # 7. Resource Availability (EFORd)

The resource availability metric measures the forced outage rates across different technology types. A forced outage occurs when a generator is unavailable to provide energy for all or part of its capacity.

There are three main measurements for forced outages, which include: Forced Outage Rate (FOR), Equivalent Forced Outage Rate (EFOR), and Equivalent Forced Outage Rate demand (EFORd). FOR and EFOR are intermediate metrics used to calculate

[9] For more information see https://www.nerc.com/pa/Stand/Reliability%20Standards/EOP-011-1.pdf.

EFORd and are included as reference to compute the final EFORd metric.[10] For the purposes of this metric, respondents must only submit the EFORd calculation. Additional information on the calculation of EFORd may be found in Appendix C.

Metric # 8. Number and Capacity of Reliability Must-Run Units

The reliability must-run (RMR) metric provides a measure of the number and capacity of units that an RTO/ISO must depend on to support critical facilities and to maintain reliability. RMR units are typically procured through out-of-market actions. RMR contracts are defined differently by each RTO/ISO but typically refer to units that continue to operate under a temporary contract after a planned retirement decision in order to resolve a reliability need. Not every RTO/ISO has these agreements, and RTOs/ISOs use various terms to refer to such arrangements. For the purposes of this Information Collection, these agreements are collectively referred to as RMR agreements. In defining what constitutes an RMR unit, each RTO/ISO should follow the definitions provided in its tariff. General naming conventions for each RTO/ISO are provided below:

- PJM: Must-Run for Reliability Generation
- CAISO: Reliability Must-Run Generation
- MISO: System Support Resources
- NYISO: Reliability Must Run
- ISO-NE: De-list Bids. These are resources that have requested retirement but are compensated to be maintained for reliability purposes.

Metric # 9. Reliability Must-Run Contract Usage

The RMR contract usage metric measures the usage of RMR contracts. This metric should include information from contracts that are in effect in any portion of the reporting period. If an RMR contract is in effect in part of a reporting period, include information from the contract in that period. If the RMR contract is in effect for parts of two reporting periods, include the appropriate information from that RMR contract in each

[10] For more information see https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx.

reporting period. Respondents should report the hours the RMR units were used, the total MWh provided by the units, and the cost of the contract in the reporting period. In the explanatory text, respondents can provide any other relevant retails that may be relevant (such as start and end dates for the RMR contracts).

Metric # 10. Demand Response Capability

The demand response capability metric measures the total amount of demand response available to the RTO/ISO.

For purposes of this Information Collection, provide the total MW values for all RTO/ISO-registered and -controlled resources, including behind the meter resources that participate in the wholesale market. Respondents should include emergency demand response programs. Respondents should not include energy efficiency programs or resources or other passive resources.

Metric # 11. Unit Hours Mitigated

The number of unit hours mitigated metric provides an indication of the frequency and magnitude that resources have been mitigated to protect against the exercise of market power.

Please note that 2016 is a leap year and the automatic calculation for data element 11.03 divides by 8784 hours, the number of hours in a leap year, instead of 8760.

Definitions for Metric #11 are as follows:

- Unit hours: One unit for one hour is one unit hour (day-ahead).
- Unit intervals: One unit for one interval is one unit interval (real-time).
- Hours of mitigation: Any hour (day-ahead) or interval (real-time) in which any resource is mitigated is considered an hour of mitigation.
- MW hours of mitigation: One MW mitigated for one hour is one MW hour mitigated.
- RTOs/ISOs that have a multi-day commitment period and use a conduct and impact test to mitigate the offers of such resources during their minimum run times for future days should report these unit hours as mitigated.

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Metric # 12. Wholesale Power Costs by Charge Type

The wholesale power cost metric disaggregates costs paid by load, thereby providing an assessment of RTO/ISO market costs. In order to be expressed in a per MWh basis, this metric requires that respondents provide a value for the data element Net Energy for Load (12.00), which is used in the calculation of other metrics. Respondents should use the MWh values provided in FERC Form No. 714 Net Energy for Load, defined as: Total generation plus imports minus exports minus losses.[11]

RTOs/ISOs with centralized capacity markets should report by the reporting period associated with the corresponding binding auction. Use the monthly values from two consecutive FERC Form No. 714 reporting years and create a Net Energy for Load value in MWh for that reporting period (which is the delivery period of the auction).

Non-RTO/ISO utilities and RTOs/ISOs without capacity markets should use the calendar year FERC Form No. 714 associated with the reporting period.

For Transmission Component of Total Wholesale Power Cost (12.03), respondents should report the total FERC-approved transmission charges paid by load for each reporting period. Respondents should include costs assigned to transmission service charges, transmission facility charges, losses, network integration transmission service, etc. Respondents should not net out or subtract any Auction Revenue Rights or Financial Transmission Right (Financial Transmission Right, Congestion Revenue Right, or equivalent) revenues that may have been returned to Load Serving Entities.

Metric # 13. Price Cost Markup

The price cost markup metric measures the difference in system-wide price that would result from using as-submitted offers and cost-based offers/reference levels. This metric also examines average markups in the top and bottom ten percent of hours based on system-wide energy prices.

There is an equation at the top of this worksheet that provides a concise description of how to calculate this metric.

[11] *See* Fed. Energy Regulatory Comm'n, *Form No. 714 - Annual Electric Balancing Authority Area and Planning Area Report*, at Schedule 3, Balancing Authority Net Energy for Load and Peak Demand Sources by Month, Net Energy for Load, (MWh), Column (e), Line 13 (2019), https://www.ferc.gov/docs-filing/forms/form-714/data.asp.

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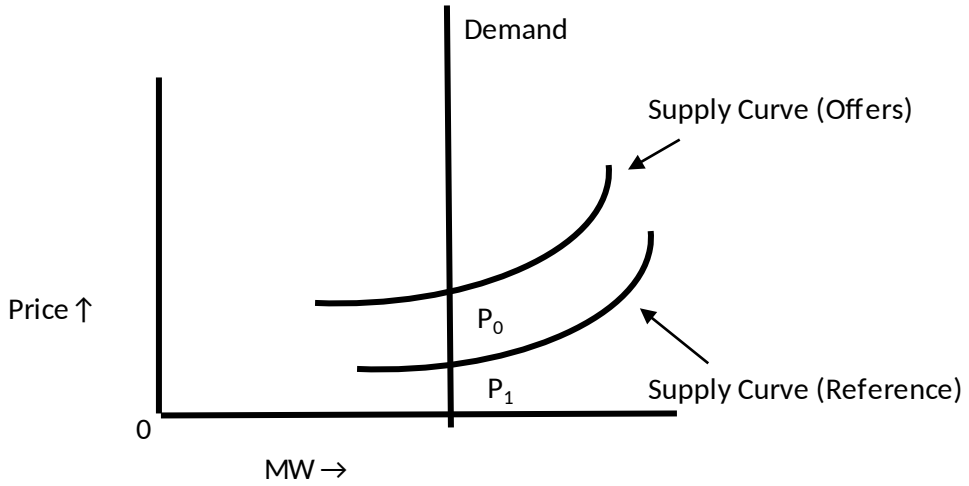
The calculation for the Price Cost Margin (13.00) requires the construction of two different supply curves for each five-minute interval in the reporting period. One supply curve is based on the generation offers and the second curve is based on the RTO/ISO reference cost for each unit. The intersection of each such supply curve with the demand curve provides a price for that five-minute interval.

The intersection of the demand curve and the offer-based supply curve provides the "price" for that interval. The intersection of the demand curve and the reference cost-based supply curve provides the "cost" for that interval. The difference between the calculated "price" and the "cost" provides the Price Cost Margin for that interval which is then averaged across the reporting period.

The calculation of each supply curve does not consider transmission constraints or ramping limitations. A visual representation of the calculation is show in Figure 1 below.

Figure 1. Price Cost Markup



Please note that there is a mechanism to create rows to report this information on a zonal basis if the RTO/ISO desires to report on a more granular level, but this is optional. If respondents choose to add information on a zonal basis, please provide any relevant information in the explanatory text field (such as why the zonal information is relevant).

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Metric # 14. Fuel Adjusted Wholesale Energy Price

The load-weighted, fuel-adjusted locational marginal price metric measures the wholesale price of energy across the RTO/ISO for a given reporting period and is derived by holding fuel costs constant over a defined time period. This metric allows for price comparisons while removing fuel price volatility.

There is an equation at the top of this worksheet that provides a concise description of how to calculate this metric. Please note that there are entries for two possible marginal fuels (coal and natural gas). Please select one base year for both fuels and adjust the annual prices to that base year.

Metric # 15. Energy Market Price Convergence

The energy market price convergence metric measures how closely the day-ahead and real-time energy prices align.

There are four equations at the top of this worksheet that provide a concise description of how to calculate this metric.

This computation should be done at the nodal level for five minute-intervals for all RTOs/ISOs. However, for CAISO, do not include imbalance market nodes.

Metric # 16. Congestion Management

Congestion represents the cost to customers of paying for more expensive energy because physical transmission line limits do not allow full delivery of the least-cost energy resources. The congestion management metric reflects the amount of congestion normalized by the RTOs/ISOs' load. Financial Transmission Rights are a financial product that provide a hedge against congestion. The metric also estimates the value of such hedges.

Financial Transmission Rights are known by various terms across the RTOs/ISOs.

CAISO: Congestion Revenue Rights

NYISO: Transmission Congestion Contracts

MISO: Financial Transmission Rights

PJM: Financial Transmission Rights

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ISO-NE: Financial Transmission Rights

SPP: Transmission Congestion Rights

Metric # 17. Administrative Costs

The administrative costs metric examines the total financial cost of operating the RTO/ISO and measures the ability of RTOs/ISOs to manage the growth rate of administrative costs as the growth rate of system load changes.

This metric requires two different values of administrative costs to be entered: (1) the sum of capital and non-capital administrative costs *billed* by the RTO/ISO and (2) the administrative costs reported on the FERC Form No. 1, TOTAL Administrative & General Expenses (row 197) page 323 from the last quarter of the filing for the reporting period which is a calendar year.

Metric # 18. New Entrant Net Revenues

The new entrant net revenues metric measures the total revenues from the energy and ancillary services (as defined in the RTO/ISO Tariff) markets that a new entrant could be expected to receive, based on proxy resources, for both a combustion turbine and a combined cycle. This metric can be an indicator of whether revenues are sufficient to attract new investment.

This metric requires information on the size, production cost, and revenue estimates for the prototypical new entrant plant for the reporting period. The calculation of this metric will require an estimate of the fraction of time when the prototypical resource will be economic over the reporting period. Revenue reflects the revenue received when the resource is marginal or infra-marginal during the reporting period. Costs reflect total production cost (including fuel costs) over the reporting period. Capacity market revenues should be omitted from this metric.

Metric # 19. Order No. 825 Shortage Intervals and Reserve Price Impacts

The shortage intervals and reserve price impact metric measures the size, duration, and impact that shortage events will have on reserve market clearing prices.

The Commission's regulations define an operating reserve shortage as "a period when the

amount of available supply falls short of demand plus the operating reserve requirement."[12] The regulations require an RTO/ISO to "trigger shortage pricing for any interval in which a shortage of energy or operating reserves is indicated during the pricing of resources for that interval."[13] Specifically, Order No. 825 describes the requirement for triggering shortage pricing:

> Specifically, we require each RTO/ISO to trigger shortage pricing for any interval in which a shortage of energy or operating reserves is indicated during the pricing of resources for that interval. ... Under this requirement, whenever a shortage of energy or operating reserves is indicated in an RTO's/ISO's pricing run software for a particular pricing interval, shortage pricing should be invoked even if during that period resources are ramping up to a particular level they are likely to reach in a few minutes.[14]

As used in the data worksheet, a Shortage Event is any event in which an RTO/ISO triggers shortage pricing under this regulation and the Order No. 825 definition.

There are definitions at the top of this worksheet and equations embedded in certain data items that provide a concise description of how to calculate the components of this metric.

Metric # 20. Net Cost of New Entry (Net CONE) Value

The Net CONE metric represents the revenues a resource could be expected to earn in the capacity market after netting out revenues from the energy and ancillary services market. The Net CONE metric is usually based on a proxy resource, such as a combined cycle or combustion turbine.

If the RTO/ISO does not produce a Net CONE value for the capacity market, please provide an estimate based on the data in the metric for the New Entrant Net Revenues.

Some RTOs/ISOs calculate Net CONE values for specific zones or sub-RTO regions.

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[12] 18 C.F.R. § 35.28(b)(6) (2019).

[13] 18 C.F.R. § 35.28(g)(1)(iv)(A) (2019).

[14] *Settlement Intervals and Shortage Pricing in Mkts. Operated by Reg'l Transmission Orgs. and Indep. Sys. Operators*, Order No. 825, 155 FERC ¶ 61,276, at P 162 (2016).

The term "Zone Name" used in the worksheet may reflect a larger area in some RTOs/ISOs than just a single zone. The worksheet includes all known areas that the RTOs/ISOs have used to calculate Net CONE values to date and users should use the same procedure and choose the respective areas for the Net CONE calculations in the drop down list from the macro.

Metric # 21. Resource Deliverability

The resource deliverability metric measures the import limitations into the RTO/ISO or sub-RTO/ISO zone, taking into account any local generation requirements in the sub-RTO/ISO region. RTOs/ISOs that use centralized capacity markets typically have a similar measurement that is analogous to a transfer capability and/or a local generation requirement. The following may refer to the RTO/ISO-specific terminology for such measurements:

PJM: Capacity Emergency Transfer Limit (CETL) and Capacity Emergency Transfer Objective (CETO)

NYISO: Locational Minimum Installed Capacity Requirements

ISO-NE: Capacity Interface Transfer Capability

MISO: Local Clearing Requirement (LCR): The minimum amount of Unforced Capacity that is physically located within a Local Reserve Zone (LRZ) that is required to meet the Loss of Load Expectation (LOLE) while fully using the Capacity Import Limit for such LRZ associated with the applicable Planning Resource Auction (PRA) or Forward Resource Auction (FRA). Report the LCR/ Unforced Capacity in the zone.

Metric # 22. New Capacity (Entry)

The new capacity metric measures whether there has been any new capacity added in the RTO/ISO since the previous capacity auction, measured by both RTO/ISO-wide and for specific sub-RTO/ISO regions that were modeled separately from the rest of the RTO/ISO.

Metric # 23. Capacity Retirement (Exit)

The capacity retirement metric measures whether there has been any capacity that has been taken out of service since the last capacity auction.

The definition of retirement should be consistent with that used in the EIA's Annual Electric Generator Report, specifically the categories of "standby" and "retired."

Metric # 24. Forecasted Demand

The forecasted demand metric measures the coincidental peak demand of a sub-RTO/ISO region at the time of the last binding auction and compares it to the realized coincidental peak demand for that reporting period.

Metric # 25. Capacity Market Procurement and Prices

The capacity market procurement metric measures the total capacity offered and procured through the central capacity market as well as the associated capacity price on an RTO/ISO-wide basis, as well as per individual zones that were modeled and/or cleared differently from the rest of the RTO/ISO.

This metric includes relevant information, such as the date of the capacity auction and the start date of the delivery period. The explanatory text box may be used to provide important details, such as why an auction date appears incongruent from other auction dates in the reporting period.

Please note that if there is no price separation over the entire five reporting periods, then only report one price in the first section (RTO/ISO-wide).

Metric # 26. Capacity Obligations and Performance Assessment Events

The capacity obligations and performance metric measures the total cleared capacity eligible for bonus payments for over-performance and subject to penalties for under-performance, along with the number and duration of performance events. This metric applies to RTOs/ISOs in which a resource with a capacity supply obligation is expected to perform in a given delivery period. This metric is reported both RTO/ISO-wide and by zone.

RTOs/ISOs that use Performance Assessment Events or Capacity Scarcity Conditions to determine performance should use the time periods that correspond determine whether capacity resources are available at expected levels during performance intervals, as defined by each RTO/ISO. For the purposes of this Information Collection, the following types of performance events should be considered:

PJM: Performance Assessment Interval

ISO-NE: Capacity Scarcity Condition

MISO: Include events in which a Load Modifying Resource may be expected to perform

NYISO: Requirements Applicable to Installed Capacity Suppliers: Sanctions for Failing to Comply with Scheduling, Bidding, and Notification Requirements

Metric # 27. Capacity Over-Performance

The capacity over-performance metric measures the total number of units that over-performed during a performance assessment period (as defined in Metric #26).

The equation at the top of this worksheet provides a concise description of how to calculate this metric. For the formulas in this metric:

Capacity = MW amount that responded;

Duration = duration of event;

n = number of individual performance events

Metric # 28. Capacity Under-Performance

The capacity under-performance metric measures the total number of units that under-performed during a performance assessment period (as defined in Metric #26).

The equation at the top of this worksheet provides a concise description of how to calculate this metric. For the formulas in this metric:

Capacity = MW amount that did not respond;

Duration = duration of event in hours;

n = number of individual performance events

Metric # 29. Total Capacity Bonus Payments and Penalties

The total capacity bonus payments and penalties metric measures the total bonus payments and penalties charged to capacity resources with supply obligations that under-performed or over-performed during a performance assessment period (as defined in Metric #26).

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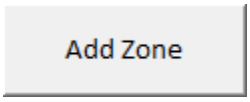
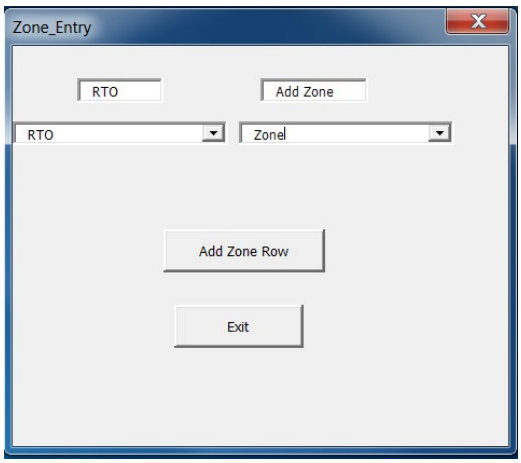
Appendix A - Entering Zonal Data

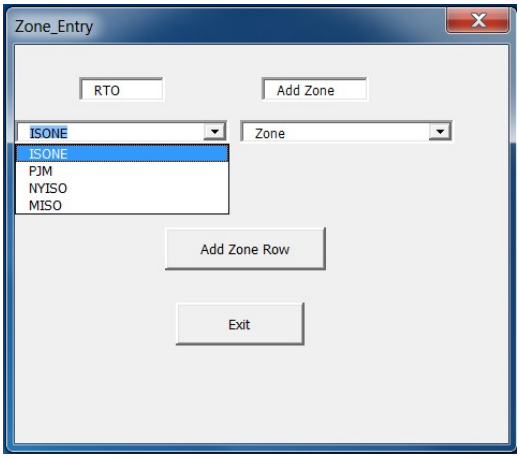
Each sheet with zonal data will have a button:



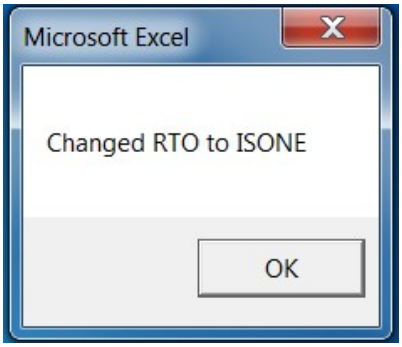
Clicking on this button will display a form:



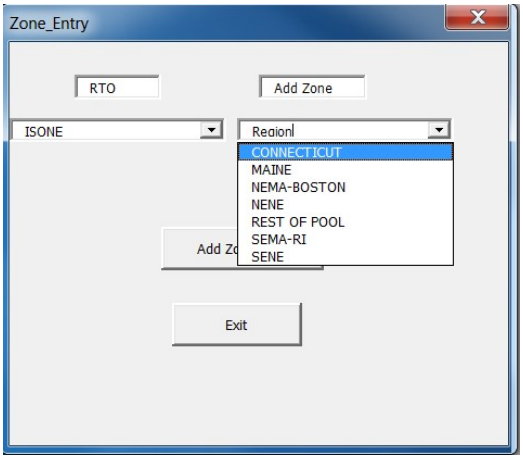
Clicking on the arrow from the RTO drop-down box will yield a list of RTOs:



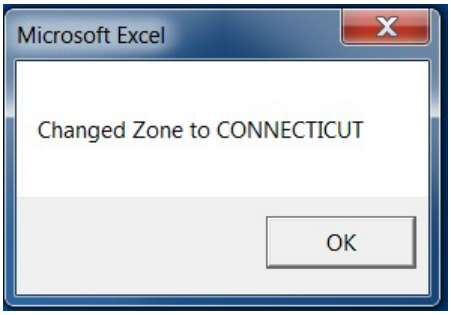
Clicking on an entry from the RTO dropdown box, as shown above, will give the following message:



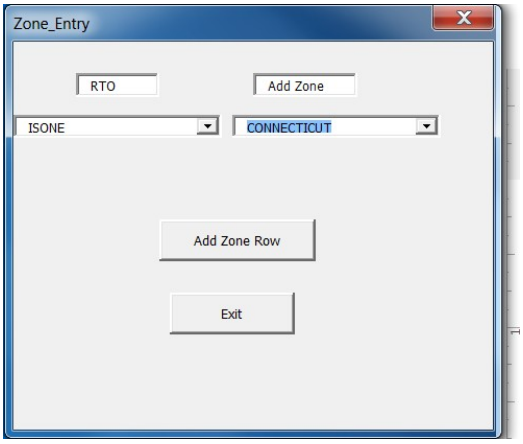
Clicking on the arrow from the "Add Zone" drop-down box will yield a list of regions:



Clicking on an entry from the "Add Zone" dropdown box, as shown above, will give the following message:



Clicking on the “Add Zone Row” Button will add the next region:



Clicking on the “Exit” button will exit the form.

Appendix B - EIA Fuel Codes

Common Metrics Fuel Code	EIA Fuel Code	EIA Description
Biomass	AB	Agricultural By-Products
Coal	ANT	Anthracite Coal
Natural Gas	BFG	Blast Furnace Gas
Coal	BIT	Bituminous Coal
Biomass	BLQ	Black Liquor
Petroleum Products	DFO	Distillate Fuel Oil (including diesel, No. 1, No. 2, and No. 4 fuel oils)
Geothermal	GEO	Geothermal
Petroleum Products	JF	Jet Fuel
Petroleum Products	KER	Kerosene
Biomass	LFG	Landfill Gas
Coal	LIG	Lignite Coal
Biomass	MSB	Biogenic Municipal Solid Waste
Other Fuel	MSN	Non-biogenic Municipal Solid Waste
Other Fuel	MSW	Municipal Solid Waste
Other Fuel	MWH	Electricity used for energy storage
Natural Gas	NG	Natural Gas
Uranium	NUC	Nuclear (including Uranium, Plutonium, and Thorium)
Biomass	OBG	Other Biomass Gas (including digester gas, methane, and other biomass gases; specify in SCHEDULE 7)
Biomass	OBL	Other Biomass Liquids (specify in SCHEDULE 7)
Biomass	OBS	Other Biomass Solids (specify in SCHEDULE 7)
Natural Gas	OG	Other Gas (specify in SCHEDULE 7)
Other Fuel	OTH	Specify in SCHEDULE 7
Petroleum Products	PC	Petroleum Coke
Petroleum Products	PG	Gaseous Propane
Other Fuel	PUR	Purchased Steam
Coal	RC	Refined Coal
Petroleum Products	RFO	Residual Fuel Oil (incl. Nos. 5 & 6 fuel oils, and bunker C fuel oil)
Coal	SC	Coal-based Synfuel. Including briquettes, pellets, or extrusions, which are formed by binding materials or processes that recycle materials.
Coal	SGC	Coal-Derived Synthesis Gas
Petroleum Products	SGP	Synthesis Gas from Petroleum Coke
Biomass	SLW	Sludge Waste
Coal	SUB	Subbituminous Coal
Solar	SUN	Solar
Other Fuel	TDF	Tire-derived Fuels
Water (includes Pumped Storage)	WAT	Water at a Conventional Hydroelectric Turbine, and water used in Wave Buoy Hydrokinetic Technology, Current Hydrokinetic Technology, and Tidal Hydrokinetic Technology And for Pumped Storage
Coal	WC	Waste/Other Coal (incl. anthracite culm, bituminous gob, fine coal, lignite waste, waste coal)
Biomass	WDL	Wood Waste Liquids excluding Black Liquor (including red liquor, sludge wood, spent sulfite liquor, and other wood-based liquids)
Biomass	WDS	Wood/Wood Waste Solids (incl. paper pellets, railroad ties, utility poles, wood chips, bark, and wood waste solids)
Other Fuel	WH	Waste heat not directly attributed to a fuel source (WH should only be reported when the fuel source is undetermined, and for combined cycle steam turbines that do not have supplemental firing.)
Wind	WND	Wind
Petroleum Products	WO	Waste/Other Oil (including crude oil, liquid butane, liquid propane, naphtha, oil waste, re-refined motor oil, sludge oil, tar oil, or other petroleum-based liquid wastes)

Appendix C - Forced Outage Calculations

Forced Outage Rate – FOR

FOR = (FOH / FOH + SH + Synchronous Hrs + Pumping Hrs) x 100%

- FOH is Forced Outage Hours, which is the sum of all hours experienced during Forced Outages (U1, U2, U3) + Startup Failures (SF).
- SH is the sum of all Unit Service Hours.
- Synchronous Hrs is the sum of all hours the unit is in the synchronous condensing mode. The units are considered to be in a non-generating service operation.
- Pumping Hrs is the sum of all hours the pumped storage unit is in pumping mode. The units are considered to be in a non-generating service operation.

Equivalent Forced Outage Rate – EFOR

EFOR = [(FOH + EFDH) / (FOH + SH + Synchronous Hrs + Pumping Hrs + EFDHRS)] x 100%

- EFDH is Equivalent Forced Derating Hours, which is each individual forced derating (D1, D2, and D3) transformed into equivalent full outage hour(s). This variable is calculated by multiplying the actual duration of the derating (hours) by the size of the reduction (MW) and dividing by the Net Maximum Capacity (NMC). These equivalent hour(s) are then summed.

$$\sum_{equivalent\ hours} \frac{Derating\ Hours\ During\ All\ Events * ¿\ MW\ Reduction}{NMC}$$

EFDH includes Forced Deratings (D1, D2, and D3) during Reserve Shutdowns (RS).

Note: The size of the MW reduction is determined by subtracting the Net Available Capacity (NAC) from the Net Dependable Capacity (NDC). In cases of multiple deratings, the size of the reduction of each derating is determined by the difference in the NAC of the unit prior to the derating and the reported NAC as a result of the derating.

- EFDHRS is Equivalent Forced Derated Hours During Reserve Shutdowns, which is each individual Forced Derating (D1, D2, and D3), or the portion of any Forced

Derating which occurred during an RS, transformed into equivalent full outage hour(s). This variable is calculated by multiplying the actual duration of the derating (hours) by the size of the MW reduction and dividing by the NMC. These equivalent hour(s) are then summed.

$$\sum_{equivalent\ hours} \frac{Derating\ Hours\ During\ RS * ¿\ MW\ Reduction}{NMC}$$

Note: The size of MW reduction is determined by subtracting the NAC from the NDC. In cases of multiple deratings, the size of MW reduction of each derating will be determined by the difference in the NAC of the unit prior to the derating and the reported NAC as a result of the derating.

Equivalent Forced Outage Rate demand – EFORd

EFORd = [(FOHd + EFDHd) / (SH + FOHd)] x 100%

Where:

- FOHd = f x FOH
- EFDHd = (EFDH – EFDHRS) if reserve shutdown events reported, or = (fp x EFDH) if no reserve shutdown events reported (an approximation). The FOHd is the number of hours a unit was in a U1, U2, U3, or SF ~~AND~~and the unit would have operated had it been available.
- f is the demand factor, denoted as $\left(\frac{1}{FOH}+\frac{1}{T}\right)/\left(\frac{1}{r}+\frac{1}{T}+\frac{1}{SH}\right)$. The variable T is average reserve shutdown time.
- fp = (SH/AH).
- AH is Available Hours, calculated as the sum of Sum of SH + Reserve Shutdown Hours (RSH) + Pumping Hours + Synchronous Condensing Hours.