PJM Manual 11:

Energy & Ancillary Services Market Operations

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Forward Market Operations

Section 2: Overview of the PJM Energy Markets

Welcome to the Overview of the PJM Energy Markets section of the PJM Manual for Energy & Ancillary Services Market Operations. In this section you will find the following information:

- An overview description of the PJM Energy Markets (see "Overview of PJM Energy Markets").
- A list of the PJM Two-Settlement Market Business Rules (see "PJM Energy Markets Business Rules").

2.3 Energy Market Business Rules

2.3.3 Market Sellers

The following business rules apply to Market Sellers:

- Self-scheduled generation shall submit an hourly MW schedule.
- Generators that are Capacity Resources shall submit offers into the Day-ahead Market, even if they are unavailable due to forced, planned, or maintenance outages.
- Generation Capacity Resources are considered Capacity Performance Resources for purposes of determining the applicable PLS for the resource if they have a daily Capacity Performance obligation for any MW of Capacity Performance product for that delivery day. In other words, if a Generation Capacity Resource has a capacity commitment for a certain number of MW in an RPM Auction for the 2016/2017 or 2017/2018 Delivery Years as an "Annual Resource" (i.e. non-Capacity Performance Resource), but also has a capacity commitment for a certain number of MW through a Transition Incremental Auction for the same Delivery Year as a Capacity Performance Resource, the PLS for that resource shall be the unit-specific PLS applicable to Capacity Performance Resources, not the default PLS that typically applies to "Annual Resources".
- Generators that are Capacity Resources and are self-scheduling shall submit offer data in the event that they are called upon during emergency procedures. Such offers shall be based on the ICAP equivalent of the cleared UCAP capacity commitment.
- Generation Capacity Resources shall submit a schedule of availability for the next seven days and may submit non-binding offer prices for the days beyond the next Operating Day.
- The set of offer data last submitted for each Generation Capacity Resource shall remain in effect for each day until specifically superseded by subsequent offers.

- If a Generation Capacity Resource is not scheduled in the Day-ahead Market, it may revise its offer and submit into the real-time market or it may self-schedule the resource.

- Generation owners planning to run generation resources scheduled in the Day-ahead Markets are required to call the PJM Control Center at least 20 minutes prior to bringing the unit online. Generation owners of self-scheduled generation resources must also provide at least 20 minutes notice.

- Generation resources that are scheduled in the Day-ahead Market have a financial obligation to sell their output in real-time. Provisions exist in the Tariff that permit make whole payments to be made to those combustion turbines that are scheduled in the Day-ahead Market and then not called on in real-time by PJM that are furthered defined in PJM Manual 28.

- When a generation resource is not scheduled in the Day-Ahead Energy Market or the Reserve Adequacy Commitment (RAC) by PJM, the Market Seller may update the cost-based schedules availability hourly three hours prior to the operating hour. The cost-based schedule made available must follow the Generation Owner's fuel cost policy as defined in PJM Manual 15: Cost Development Guidelines. A generation resource may not change schedule availability once it has been committed by PJM for the hours in which it is committed. In order to update cost-based schedule availability, the Generation Owner must select the 'Use Cost Schedule in Real Time' flag in Markets Gateway (New Schedule Availability Update Tab) between 1415-2100 the day prior to the operating day. Selecting this flag will make the price-based schedule unavailable for the operating day selected.

- Generation Capacity Resources that have notification, startup, soak, and minimum run times that exceed 24 hours must submit binding offer prices for the next seven days.

- Generation Capacity Resources that have notification plus startup times that exceed 24 hours and have been called on by PJM dispatch in advance of the close of the Day-ahead Market bid period for the desired Operating Day must modify their notification and startup time prior to the close of the market bid period for that day in order to create the possibility for the unit to be committed in the Day-ahead Market.

- Generation resources that are committed by PJM in advance of the Day-Ahead Energy Market will be offer capped and committed on the available schedule at the time of the commitment. The cost-based schedule made available must follow the Generation Owner's fuel cost policy as defined in PJM Manual 15: Cost Development Guidelines.

- Each Generation Capacity Resource must make available at least one cost-based schedule and for price based units, if it falls within the types of generators in the PJM Unit Parameter matrix it must also submit a Price Based Parameter Limited Schedule.

- Generation offers may consist of startup, no-load and incremental energy offer.

- Generation resource cost based incremental energy offers must be developed in accordance with Manual 15 and PJM's governing documents.

- Generation resource market based incremental energy offers may not exceed $1,000/MWh unless cost based incremental energy offer is greater than $1,000/MWh then the market based incremental energy offer is capped at the lesser of the cost based incremental energy offer or $2,000/MWh.

- Market Sellers with a cost based incremental energy offer greater than $2,000/MWh may be eligible to receive credit for Operating Reserves. Market Sellers must submit all relevant documentation demonstrating the calculation of costs greater than $2,000/MWh to PJM and the MMU in accordance with Attachment D.

- Emergency and Pre-Emergency Demand Resource emergency or pre-emergency offer price may not exceed the following:

  - 30 minute lead time: $1,000/MWh, plus the applicable Primary Reserve Penalty Factor, minus $1.00
  - approved 60 minute lead time: $1,000/MWh, plus [the applicable Primary Reserve Penalty Factor divided by 2]; and
  - approved 120 minute lead time: $1,100/MWh.

- An economic demand resource offer may not exceed $1,000/MWh, plus the applicable Primary Reserve Penalty Factor, minus $1.00

- Energy resources may offer into the Day-ahead Market or Real-time Market.

- If an Energy resource does not submit offer data, then the offer is assumed to be a zero MW quantity.

- Intermittent Generation Resources, that are Capacity Resources, and Capacity Storage Resources shall meet the must offer requirement by either self-scheduling (Availability = Must Run) or may allow the Day-ahead Market to schedule by offering the unit as a dispatchable resource (Availability = Economic).

- The hourly Day-ahead self-scheduled values for intermittent resources and Capacity Storage Resources may vary hour to hour from the capacity obligation value,

- For price-based units, a price-based parameter limited schedule must be offered into the Day-ahead and Balancing Market. All price-based units have the option of submitting a second price schedule that is not parameter limited. In addition to the price-based schedules, one cost-based schedule shall be made available for PJM's use in the event that the resource is used to control a transmission constraint. The cost-based schedule shall be parameter-limited.

- A generator offer that is accepted for the Day-ahead Market automatically carries over into the balancing market.

- A generator offer for a generating unit with combined cycle capability shall make available either the schedules for the CTs or the schedule for the combined cycle unit, not both. Only CTs may submit weather curves, which specify MW limits for CTs as a function of temperature.

- Forecast points shall consist of a daytime temperature and a nighttime temperature.

- There are separate weather curves for economic MW and for emergency MW.

- Each CT is assigned to a weather point, which is entered by the Operating Company. As generating units change ownership it may be necessary to add weather points. The default for the weather points is the PJM temperature forecast.

- The priority of generator offer operating limits are as follows: (1) Unit Hourly MW limits (Markets Gateway>Generator>Unit>Hourly), (2) Daily Unit Schedule Limits (Markets Gateway>Generator> Schedules>Detail), (3) Unit limits (Markets Gateway>Unit>Detail). Daily unit schedule MW limits can be overridden by unit hourly MW limits. Weather curves for CTs apply to both unit limits and schedule limits.

- Market Sellers may submit increment offers or decrement bids at any hub, transmission zone, aggregate, single bus or eligible external interface point (posted on the PJM Web site) for which an LMP is calculated. It is not required that physical generation or load exists at the location that is specified in the increment offer or decrement bid.

- A price-based unit has the option to choose cost-based start-up and no-load fees. A price-based unit that chooses the cost based option may change the start-up and no-load fees daily. A priced-based unit that chooses the price based option will continue to be able to change the start-up and no-load fees twice a year.

- The choice between using cost-based and price-based startup and no-load fees can be made twice a year during the same open enrollment window (on or before 1030 hours March 31 for the period April 1 through September 30 and on or before 1030 hours September 30 for the period October 1 through March 31). Period 1 is defined as the period of time beginning April 1 and ending September 30. Period 2 is defined as the period of time beginning October 1 and ending March 31. If a priced based unit chooses the cost-based start-up and no-load fees option, the decision cannot be changed until the next open enrollment period takes place.

- When a unit or part of a unit is designated as Maximum Emergency (ME), this means that the referenced output levels may require extraordinary procedures and that the designated MW is available to PJM only when PJM requests Maximum Emergency Generation. Designation of a unit or a portion of a unit as ME should be based on the

real operating characteristics of the unit and not be used to withhold all or a portion of the capacity of a unit from the Day-ahead Market.

- Designation of all or part of a unit's capacity as Maximum Emergency (ME) constitutes withholding in the Day-ahead Market, if:
  - The capacity is not designated as ME in the bid for the Real-time Market, or;
  - There is no physical reason to designate the unit as ME.
- The consequence of withholding a unit's capacity under ME is:
  - The unit will be given an outage ticket which reflects a de-rating equal to the positive difference in capacity designated Maximum Emergency in the bid for the Day-ahead Market and capacity designated Maximum Emergency in the bid for the Real-time Market.
- A unit bid includes an Economic Maximum point, which is the highest output on its bid curve that the unit is offering for economic dispatch. The Economic Max represents the highest unrestricted level of MW that the operating company will operate the unit, under its offer, for economic dispatch. The Economic Max point should be based on the actual capability of the unit to operate on its bid curve and should not be used to withhold a portion of the capacity of a unit from the Day-ahead Market.
- Reduction of Economic Max MW constitutes withholding in the Day-ahead Energy Market, if:
  - The Economic Max MW is higher in the bid for the Real-time Energy Market than in the bid for the Day-ahead Market, or;
  - There is no physical reason to designate a lower Economic Max in the bid for the Day-ahead Market bid than in the bid for the Real-time Market.
- The consequence of withholding a unit's capacity by reduction of Economic Max MW is:
  - The unit will be given an outage ticket which reflects a derating equal to the positive difference in Economic Max output designated in the bid for the Real-time Market and in the bid for the Day-ahead Market.
- Generating units that are connected to the system at the same electrical location may be aggregated and offered into the PJM market as a single unit.
- The aggregated unit must be offered into the PJM markets as a single unit with only one set of offer data, including startup, no load and incremental energy. This rule applies to all energy and ancillary service markets into which the unit is offered.
- Hourly integrated, revenue quality meter data must be submitted to Power Meter on the basis of the aggregated unit.

- Real-time meter data is required for each physical unit in order to support the PJM state estimator model and to allow energy settlement on an individual unit level.

- Balancing Operating Reserve deviations for aggregated units will be calculated based on the hourly aggregated unit output as defined in ***PJM Manual 28: Operating Agreement Accounting, Section Operating Reserve Accounting***.

- Balancing Operating Reserve Generator deviations for units deemed to be "not following dispatch" that occur at a single bus will be able to offset one another.

- A "single bus" will be any unit located at the same site and that has the identical electrical impacts on the transmission system. Units are deemed to have identical electrical impacts on the transmission system if they meet the following criteria:

  - Units that have identical dfax to the system
  - Units that are on the same low side of the bus (i.e. connected at same voltage level)

- In the case of units on busses with bus-tie breaker, if bus-tie breaker was open less than 5% of the hours in the previous 3 years, supplier netting of units will be allowed across this bus-tie breaker.

- PJM will maintain a list of units that are deemed to have identical electrical impacts on the transmission system to be used for Balancing Operating Settlement. PJM will review the list on an annual basis. Generators will be reviewed as needed during any new generation activation or reconfiguration process as defined in ***Section 7 of PJM Manual 14d: Generator Operational Requirements.***

- Unit parameters do not have to be identical for the units' deviation MW to offset one another.

- If multiple units are deemed "not following dispatch" at a single bus, the deviation MW and direction of each unit at that bus will be summed to determine the deviation MW at that bus.

- Units at a "single bus" must be owned or marketed by single PJM Market Participant.

- Unit modeling changes in the PJM Markets Gateway system (unit type, aggregation level, for example), not including changes based on physical changes at the plant, can be made at the beginning of each quarter.

- CT's are permitted to provide an Economic Minimum less than the physical economic minimum value of the unit. Per the ***PJM Manual for Operating Agreement Accounting,*** for settlement purposes, PJM determines the resource's hourly UDS LMP Desired MWh based on its dispatch rate, offer data, and minimum and maximum energy limits for that hour. For steam units, the lesser of the day-ahead scheduled and real-time

economic minimum limits, and the greater of the day-ahead scheduled and real-time economic maximum limits, are used. For CT's, operating at PJM direction, the actual real-time output is used as the UDS LMP Desired MWh value.

2.3.4 Minimum Generator Operating Parameters – Parameter Limited Schedules

Below is the list of business rules to require units to submit schedules that meet minimum accepted parameters.

Market Sellers are required to submit, per Section 2.3.3 of this Manual, as follows: (1) at least one cost-based schedule that is parameter limited, (2) one price-based schedule, and (3) one price-based parameter limited schedule. Generation Capacity Resources shall be committed on these schedules under the following circumstances:

- For the 2014/2015 through 2017/2018 Delivery Years, in the event that PJM: (i) declares a Maximum Generation Emergency; (ii) issues a Maximum Generation Emergency Alert; or (iii) schedules units based on the anticipation of a Maximum Generation Emergency or a Maximum Generation Emergency Alert for all or any part of such Operating Day, generation resources will be committed on the more economic schedule of their price based parameter-limited schedule and price based schedule.

- For Capacity Performance Resources, in the event that PJM: (i) declares a Maximum Generation Emergency; (ii) issues a Maximum Generation Emergency Alert, Hot Weather Alert, Cold Weather Alert; or (iii) schedules units based on the anticipation of a Maximum Generation Emergency, Maximum Generation Emergency Alert, Hot Weather Alert or Cold Weather Alert for all or any part of such Operating Day; generation resources will be committed on the more economic schedule of their price based parameter limited schedule and price based schedule.

- For Base Capacity Resources, in the event that PJM: (i) declares a Maximum Generation Emergency; (ii) issues a Maximum Generation Emergency Alert, Hot Weather Alert during hot weather operations; or (iii) schedules units based on the anticipation of a Maximum Generation Emergency, Maximum Generation Emergency Alert, Hot Weather Alert during hot weather operations for all or any part of such Operating Day; generation resources will be committed on the more economic schedule of their price based parameter limited schedule and price based schedule.

- If a Market Seller fails the three pivotal supplier test in the Energy Markets, the Seller's resources will be committed on the schedule with the least cost among the cost-based schedule, price-based schedule and price-based parameter limited schedule.

- For the 2014/2015 through 2017/2018 Delivery Years, PJM will define a list of minimum acceptable operating parameters for Generation Capacity Resources other than Capacity Performance Resources, and for the 2018/2019 Delivery Year for generation resources of FRR Entities not committed as Base Capacity Resources or Capacity Performance Resources, based on an analysis of historically submitted offers, for each unit class for the following parameters:

- Turn Down Ratio
- Minimum Down Time
- Minimum Run Time
- Maximum Daily Starts
- Maximum Weekly Starts
- Soak Time

- For the 2016/2017 and subsequent Delivery Years for Capacity Performance Resources, and for the 2018/2019 and 2019/2020 Delivery Years for Base Capacity Resources, the list of minimum acceptable parameters will consist of the following parameters:
  - Turn Down Ratio
  - Minimum Down Time
  - Minimum Run Time
  - Maximum Daily Starts
  - Maximum Weekly Starts
  - Maximum Run Time
  - Start Up Time
  - Notification Time
  - Soak Time

- For the Delivery Years up to an including of the 2017/2018 Delivery Year, the limits set forth in the Parameter Limited Schedule Matrix shall apply to Generation Capacity Resources, other than Capacity Performance Resources, and for the 2018/2019 Delivery Year for generation resources of FRR Entities not committed as Capacity Performance Resources or Base Capacity Resources, unless the generation resource is operating pursuant to an exception from the default values due to physical operational limitations that prevent the resource from meeting the minimum parameters. The Parameter Limited Schedule Matrix is found in Section 6.6(c) of Attachment K-Appendix of the Tariff and the parallel provision of Schedule 1 of the Operating Agreement found at: http://www.pjm.com/documents/agreements.aspx.

- For the 2018/2019 and 2019/2020 Delivery Years for Base Capacity Resources, and the 2016/2017 Delivery Year and subsequent Delivery Years for Capacity Performance Resources, PJM will determine for each such resource its unit-specific parameter limits based on the operating design characteristics and other constraints of that resource. The resource's unit-specific parameter limits will apply for that resource unless it is operating pursuant to an exception from those limits under section 6.6(h) of Attachment K-Appendix of the Tariff and the parallel provision of Schedule 1 of the Operating

Agreement due to operational limitations that prevent it from meeting the minimum resource parameters.

- Market Sellers that do not believe their individual resources can meet the unit-specific parameter limits determined by PJM due to actual operating constraints, can request that PJM establish adjusted unit-specific parameter limits for those resources. The Market Seller may request adjusted unit-specific parameter limits by providing all the necessary data, information and documentation to PJM in order to justify and support the adjusted unit-specific parameter limits at unitspecificpls@pjm.com by no later than the February 28 immediately preceding the first Delivery Year for which the adjusted unit-specific parameter limits are requested to commence, and provide technical information about the operational limits that support the requested adjustment. PJM shall notify the Market Seller if its request was approved or denied by no later than April 15. The effective date of the requested parameter shall be no earlier than June 1 of the first applicable Delivery Year. PJM will consult with the Market Monitoring Unit and consider any input received in its determination of a resource's unit-specific parameter limits.

- Once PJM has made a determination of the unit-specific parameter limited schedule values for a Generation Capacity Resource, those values will remain applicable to the resource until such time as the Office of the Interconnection determines that a change is needed based on changed operational capabilities of the resource.

- The operational limitations that support adjusted unit-specific parameter limits shall be (a) physical operational limitation based on operating design characteristics of the resource, or (b) other actual physical constraints that are not based on the characteristics of the resource, including contractual limitations. For a contractual limit to be considered a physical constraint which the Market Seller should be permitted to reflect in its unit-specific parameter limits for the resource, and not an economic constraint which should not be taken into consideration in the determination of the unit-specific parameter limits for that resource, the contractual limit must be based on a natural gas pipeline transportation contract that is for the best available service offered by the pipeline and available to the Market Seller rather than a lower cost option that provides less flexible service. For example, if a pipeline offers hourly nominations and/or no notice service, the resource's operational parameters will be based on those more flexible services that are available even if a less flexible service is procured.

- Only actual physical operational limitations, fuel contractual constraints, environmental limitations and other actual constraints on a resource will be considered for adjustment requests. The following list is not an exhaustive list, but provides examples of the types of information and documentation PJM would request to support adjusted unit-specific parameter limits requests:

    - Start Up Time adjustments –OEM (Original Equipment Manufacturer) backup documentation, control room data, startup/loading curves and a detailed start-up sequence listing the required steps along with the time required to perform each step.

- Maximum Daily/Weekly Starts adjustments –OEM backup documentation and/or detailed start-up and shutdown sequences that show why the default start parameters cannot be physically met.
- Soak Time adjustments - OEM backup documentation for physical unit constraints that requires the unit to be held at a certain output level for the requested time period (e.g due to boiler drum or turbine shell soaking requirements, staggered CT start times for combined cycles, etc.).
- Minimum Run Time adjustments –OEM backup documentation for physical unit constraints that requires the unit to be operated for the requested time period after it is dispatchable.
- Minimum Down Time adjustments - OEM backup documentation and a detailed shut down sequence listing the required steps to bring the unit into a ready for startup condition along with the time required to perform each step.
- Notification Time Adjustment –A detailed sequence of events of the tasks required prior to startup along with the time required to perform each step. In addition gas pipeline contracts may be submitted for review.
- Turn Down Ratio Adjustments –Requests for adjustments to this parameter based on physical equipment limitations should include OEM backup documentation describing the equipment limitation. Requests for adjustments to this parameter based on emissions permit limitations and related concerns will require inclusion of the applicable Air Permit as well as emissions data for justification.

- There are three different types of exceptions to the Parameter Limited Schedule Matrix default values:

- **Temporary Exception –** is a one-time exception lasting for 30 days or less during the twelve month period from June 1 to May 31.

- **Period Exception –** is an exception lasting for at least 31 days but no more than one year **during** the twelve month period from June 1 to May 31.

- **Persistent Exception –** is an exception lasting for at least one year.

- For the Delivery Years up to and including the 2018/2019 Delivery Year, the MMU shall review the Parameter Limited Schedule Matrix, included in Section 6.6(c) of Attachment K-Appendix of the Tariff and the parallel provision of Schedule 1 of the Operating Agreement, annually, and, in the event it determines that revision is appropriate, shall provide a revised matrix to PJM by no later than December 31 that occurs immediately prior to the commencement of the applicable Delivery Year. Pursuant to section II.B of Attachment M – Appendix of the Tariff, period and persistent exception requests must send to Parameters.Exceptions@pjm.com by no later than February 28 immediately preceding the twelve month period from June 1 to May 31 during which the exception is requested to commence. All market sellers that wish to submit a Parameter-Limited

Schedule for units with physical operational limitations that prevent the units from meeting the minimum parameters may submit a request for an exception via Markets Gateway for evaluation. Each market seller seeking an exception must supply the required historical unit operating data in support of the period or persistent exception and if the exception requested is based on new physical operational limits for the resource for which historical operating data is unavailable, the generation resource may also submit technical information about the physical operational limits for period exceptions of the resource to support the requested parameters.

- Physical operational limitations for period or persistent exceptions may include but are not limited to, metallurgical restrictions due to age and long term degradation; physical design modifications; operating permit limitations; operating limits imposed by federal, state or local regulatory requirements or insurance carrier requirements; consent decrees; manufacturer technical bulletins; or environmental permit limitations under non-emergency conditions. Each market seller requesting a period or persistent exception based on new physical operational limitations for a unit may submit the technical information, required due to the unavailability of historical operating data, supporting the requested parameters, which must be based on the definition of physical operational limitations for period or persistent exceptions of the unit. Each temporary, period or persistent exception request will indicate the expected duration of the requested exception including the date on which the requested exception period will end. If physical conditions at the unit change such that the exception is no longer required, the market seller is obligated to inform PJM and the MMU and the exception will be reviewed to determine if the exception continues to be appropriate.

- If a request for a period or persistent exception is received by February 28, the MMU will review the exception and provide the Market Seller and PJM with a determination in writing whether the request raises market power concerns by April 1, and PJM shall provide its determination whether the request is approved or denied by no later than April 15. Should PJM require additional technical expertise in order to evaluate the exception request, PJM will engage the services of a consultant with the required expertise. A generation resource shall notify the MMU and PJM when the temporary exception commences and terminates and provide to the MMU and PJM within three days following such commencement documentation explaining in detail the reasons for the temporary exception, that includes:

    - Unit Name
    - Parameter Limit Requested
    - Reason for Temporary Exception Request
    - eDart ticket
    - Justification for Temporary Exception Request, including required unit operating data in support of the exception
    - Date on which the exception period will end.

- Market Seller can communicate the resource's current operational capabilities to PJM before and after Day-ahead Energy Market closes through 'Real Time Values' functions on Markets Gateway.
    - Real Time Values should be utilized when a resource cannot operate according to the unit specific parameters (Capacity Performance and Base Capacity resources), default Parameter Limited Schedules (non-Capacity Performance resources), or approved Parameter Limit exceptions.
    - The Real Time Values consist of the following values:
        - Turn Down Ratio
        - Minimum Down Time
        - Minimum Run Time
        - Maximum Run Time
        - Start Up Time
        - Notification Time
    - A Generation Capacity Resource that operates outside of its unit-specific parameters will not receive Operating Reserve Credits nor be made whole for such operation when not dispatched by the Office of the Interconnection, unless the Market Seller of the Generation Capacity Resource can justify to the Office of the Interconnection that operation outside of such unit -specific parameters was the result of an actual constraint. Such Market Seller shall provide to the Market Monitoring Unit and the Office of the Interconnection (unitspecificmakewhole@pjm.com) its request to receive Operating Reserve Credits and/or to be made whole for such operation, along with documentation explaining in detail the reasons for operating its resource outside of its unit-specific parameters, within thirty calendar days following the issuance of billing statement for the Operating Day. The Market Seller shall also respond to additional requests for information from the Market Monitoring Unit and the Office of the Interconnection. The Market Monitoring Unit shall evaluate such request for compensation and provide its determination of whether there was an exercise of market power to the Office of the Interconnection by no later than twenty-five calendar days after receiving the Market Seller's request for compensation. The Office of the Interconnection shall make its determination whether the Market Seller justified that it is entitled to receive Operating Reserve Credits and/or be made whole for such operation of its resource for the day(s) in question, by no later than thirty calendar days after receiving the Market Seller's request for compensation.

- If PJM does not receive a complete exception request, and the unit did not clear in the Day-ahead Energy Market, the unit schedule will returned to its previous parameter limits.

- Physical operational limitations for temporary exceptions may include, but are not limited to, short term equipment failures, short term fuel quality problems such as excessive moisture in coal fired units, or environmental permit limitations under non-emergency conditions.

- Market Sellers may use exceptions to reflect physical operational limitations (e.g., operational flow orders) on natural gas pipelines and local natural gas distribution companies (LDC). These exceptions will be reviewed by PJM and the MMU and approved by PJM, in accordance with the applicable provisions of the Tariff and Operating Agreement.

- In addition, physical operational limitations for temporary exceptions may include any physical operational limitation for period exceptions that arises during the annual period from June 1 to May 31 to which period exceptions apply.

- For steam units, regardless of fuel type, the average historical values for any of the parameters as offered by the owners for the calendar year 2006 may be used in place of the values in the parameter-limited schedule matrix. For steam units, regardless of fuel type, the historical averages are calculated from the market based offers for market based units and from cost-based offers for units that made only cost-based offers.

- For combined cycle units:

  - If the 2006 average historical market-based offer parameters are within the limits in the parameter matrix, the unit will be limited to that 2006 historical average. If not then ii) applies;

  - If the unit was offered with market-based offer parameters for 10% or more of the days (36 days minimum) at a level at or more flexible than parameters in matrix, the unit will be limited at that level. If not the iii) applies

  - If the 2006 average historical market based offer parameters exceed the limits in the matrix (less flexible than the parameters in the matrix) then the unit will be limited to the level at which the market-based parameter was bid to the most flexible level for 10% or more of the days (36 days minimum) at that level.

- If physical conditions at the unit change such that the exception is no longer required, the market seller is obligated to inform PJM and the MMU and the exception will be terminated.

- Market sellers may indicate to PJM and the MMU those units with the ability to operate on multiple fuels. Multiple-fuel units may submit a parameter-limited schedule associated with each fuel type. All Parameter-Limited Schedules must be submitted via Markets Gateway seven days prior to the beginning of each period beginning June 1. Any exceptions required for any of the parameter-limited schedules submitted for multiple-fuel units will be required to be submitted and approved via the exception process, by the applicable deadlines.

- Nuclear Units are excluded from eligibility for Operating Reserve payments except in cases where PJM requests that nuclear units reduces output at PJM's direction or where a physical problem at a nuclear unit requires a risk premium and that risk premium is submitted to and accepted by the MMU. Other specific circumstances will be evaluated on a case-by-case basis by PJM and the MMU.

- Market Sellers shall notify in writing the MMU and the PJM of a material change to the facts relied upon by the MMU and/or the PJM to support a temporary, period or persistent exception. MMU will provide written notice of any change to its determination regarding the exception request within 15 days of receipt of such notice to PJM and the Market Seller. PJM will notify the Market Seller and MMU in writing, by no later than 20 days after receipt of the Market Seller's notice, whether it is revoking or confirming its approval of the exception request.

- If PJM determines that its approval of the exception should be revoked or terminated, (1) for Generation Capacity Resources that are not Base Capacity Resources or Capacity Performance Resources the default values specified in the Parameter Limited Schedule Matrix shall apply, (2) for Base Capacity Resources and Capacity Performance Resources without approved adjusted unit-specific values, the unit-specific values determined by PJM shall apply, and (3) for Base Capacity Resources and Capacity Performance Resources with approved adjusted unit-specific values, the adjusted unit-specific values shall apply. PJM shall notify the market seller 3 business days before such revocation.

2.3.6 PJM Activities

The following business rules apply to PJM activities:

- PJM shall post on the Markets Gateway System, the PJM load forecast, total bid demand, and Day-ahead Scheduling Reserve (Operating Reserve) objective for each hour of the next Operating Day by 1330 at the completion of the day-ahead scheduling process.

- PJM shall post forecasts of total hourly demand for the next four days and peak demand for the subsequent three days.

- PJM shall post hourly LMP, Congestion Price, and Loss Price values for the next operating day at the completion of the day-ahead scheduling process by 1330.

- PJM shall post the schedule of demand, supply, and bilateral transactions for private viewing by market participants.

- PJM may perform supplemental resource commitments after the day-ahead schedule is posted in order to maintain reliable operation. Such supplemental commitments are based on minimizing startup and no-load costs.

- During the various resource commitment analyses, PJM may limit its dependence on Combustion Turbines to provide reserves in order to maintain reliable operational standards. Such limits shall be based on past performance of these units.

- PJM Market Operators will commit in the Day-ahead Market any generation resources that were scheduled by PJM dispatch in advance of the Day-ahead Market and are still required for the operating day and therefore not cancelled. The scheduled hours for the pre-committed generation resource in the Day-ahead Market will at least include the hours where PJM dispatch has scheduled the resource as well as any additional hours where the resource was deemed to be economic as a result of the Day-ahead Energy market solution.

- PJM's market power mitigation procedure continues under the energy market procedure. If transmission limits are identified during the day-ahead scheduling process or during real-time operations, the appropriate generators (those for which the owner fails the Three-Pivotal Supplier Test as detailed in Section 6.4.1 paragraphs (e) and (f) of the PJM Operating Agreement) are offer-capped.

- Units are offer-capped at lesser of their cost-based or price-based schedules, including start-up and no-load components. Specific details regarding determination of cost-based offers may be found in PJM Manual M-15 (Cost Development Guidelines) and Section 6.4.2 of the PJM Operating Agreement.

- For the Day-ahead Market, the offer caps will apply for the length of time the unit is scheduled.

- Non-CT units offer-capped in the Day-ahead Market will be offer-capped in the real-time market.

- Units offer-capped in the real-time market shall remain offer-capped until the unit's scheduled soak time plus minimum run time is exhausted. Once the scheduled soak time plus minimum run time for a particular unit expires in the real-time market, if that unit is no longer needed to control any of the constraints for which it was originally started but the unit is kept on-line, the decision as to whether the unit remains offer-capped will be made as follows:

  - If PJM needs the unit for economics (on its price-based offer) and the unit is not required to relieve a current or anticipated constraint, the unit will be un-capped.
  - If released by PJM, any subsequent offer-capping decision for a unit will be determined by the Three-Pivotal Supplier Test.
  - Units remain eligible to set LMP when offer-capped.

- Units brought on-line for economics prior to constrained conditions will not be offer-capped.

- Once the price-based switch is set to price (set by PJM upon request from generation owner), the generator owner cannot return to a cost-based offer (cost-capped or historic LMP-capped).
- Price-sensitive demand can set LMP in the Day-ahead Market.
- Participants can submit PRD Curves per business rules in Section 12 of this manual.

2.3.7 Mechanical/Technical Rules

A valid generator offer consists of the following elements:

For a Generation Capacity Resource a valid generator offer consists of a parameter limited price-based schedule (if the unit is price-based) and at least one cost-based schedule. The default values for the schedules are:

- Day-ahead Market switch is yes (1).
- Balancing market switch is yes (1).
- Use start-up & no-load switch is yes (1).
- Use offer slope switch is no (0).
- Condense available switch is blank or no (0).
- Startup and no load costs are zero.
- Hourly economic max/min and emergency max/min are the unit level economic and emergency MW limits, respectively.
- Minimum down time, soak times, minimum run time, start times, and notification times are zero.
- Maximum run time and maximum number of starts per week are infinity.
- The default for incremental offer curve data is $0. If the last MW point on the segment curve is less than the maximum emergency limit, then the curve is extended up to the emergency maximum limit using zero slope from the last incremental point on the curve.
- For a non-Capacity Resource, a valid generator offer consists of a price-based schedule (if the unit is price-based) and at least one cost based schedule. The default values for the schedules are:
    - Day-ahead Market switch is yes (1).

- Balancing market switch is yes (1).
- Use start-up & no-load switch is yes (1).
- Use offer slope switch is no (0).
- Condense available switch is blank or no (0).
- Startup and no-load costs are zero.
- Hourly economic max/min and emergency max/min are the unit level economic and emergency MW limits, respectively.
- Minimum down time, soak times, minimum run time, start times, and notification times are zero.
- Maximum run time and maximum number of starts per week are infinity.
- The default for incremental offer curve data is $0. If the last MW point on the segment curve is less than the maximum emergency limit, then the curve is extended up to the emergency maximum limit using zero slope from the last incremental point on the curve.
- External resources can only submit start up and no load costs if the entire output of the unit is available for PJM dispatch

- Valid offers for demand bids, price sensitive and fixed, consist of the following items:
  - MW, with a default value of 0 MW. Demand bids should not include losses.
  - Location (transmission zone, aggregate, or single bus)
  - Price at which demand shall be curtailed (for price-sensitive bids)
  - PJM shall apply Demand Bid Screening to all Demand Bids submitted in the Day-Ahead Energy Market for each LSE, separately by Zone. PJM will automatically reject a LSE's Demand Bids if the total MW volume of such bids exceeds the LSE's Demand Bid limit for any hour in such Operating Day.
  - On a daily basis, PJM will update and post each LSE's Demand Bid Limit in each applicable Zone. Such Demand Bid Limit will apply to all Demand Bids submitted by that LSE for each future Operating Day for which it submits bids.
  - The Demand Bid Limit is calculated using the following equation:

    Demand Bid Limit = greater of (Zonal Peak Demand Reference Point * 1.3), or (Zonal Peak Demand Reference Point + 10MW)

    Where:

    - Zonal Peak Demand Reference Point = for each Zone: the product of (a) LSE's Recent Load Share, multiplied by (b) Peak Daily Load Forecast.

- LSE's Recent Load Share is the LSE's highest share of Network Load in each Zone for any hour over the previous seven Operating Days.
- Peak Daily Load Forecast is PJM's highest available peak load forecast for each applicable Zone that is calculated on a daily basis.

- PJM may allow a LSE to submit bids in excess of its Demand Bid Limit when circumstances exist that will cause, or are reasonably expected to cause, a LSE's actual load to exceed its Demand Bid Limit on a given Operating Day. Examples of such circumstances include, but are not limited to, changes in load commitments due to state sponsored auctions, mergers and acquisitions between PJM Members, and sales and divestitures between PJM Members.
- A LSE whose Demand Bids are rejected as a result of Demand Bid Screening may change the Demand Bids to reduce the total megawatt volume to a level that does not exceed the Demand Bid Limit. Re-submissions must occur prior to Market closing for the operating day.

2.3.10 Operating Parameter Definitions

Cold/Warm/Hot Notification Time - The time interval between PJM notification and the beginning of the start sequence for a generating unit that is currently in its cold/warm/hot temperature state. Start sequence may include steps such as any valve operation, starting feed water pumps, startup of auxiliary equipment, etc.

Cold/Warm/Hot Start-up Time - The time interval, measured in hours, from the beginning of the start sequence to the point after generator breaker closure which is typically indicated by telemetered or aggregated state estimator MWs greater than zero for a generating unit in its cold/warm/hot temperature state. For a Combined Cycle unit it is the time interval from the beginning of the start sequence to the point after first combustion turbine generator breaker closure which is typically indicated by telemetered or aggregated state estimator MWs greater than zero. Start sequence may include steps such as any valve operation, starting feed water pumps, startup of auxiliary equipment, etc.

Other more detailed actions that could signal the beginning of the start sequence could include but are not limited to the operation of pumps, condensers, fans, water chemistry evaluations, checklists, valves, fuel systems, combustion turbines, starting engines or systems, maintaining stable fuel/air ratios, and other auxiliary equipment necessary for startup.

Minimum Run Time (hour) - The minimum number of hours a unit must run, in real-time operations, from the time after ~~generator breaker closure which is typically indicated by telemetered or aggregated state estimator MWs greater than zero~~ the unit is dispatchable to the time of generator breaker opening, as measured by PJM's state estimator. For Combined Cycle units this is the time period after the ~~first combustion turbine generator breaker closure which is typically indicated by telemetered or aggregated state estimator MWs greater than zero and~~unit is dispatchable to the time of the last generator breaker opening as measured by PJM's state estimator.

Turn Down Ratio – The ratio of a unit's economic maximum MW to its economic minimum MW.

Minimum Down Time (hour) - The minimum number of hours under normal operating conditions between unit shutdown and unit startup, calculated as the shortest time difference between the unit's generator breaker opening and after the unit's generator breaker closure, which is typically indicated by telemetered or aggregated state estimator MWs greater than zero. For Combined Cycles units this is the minimum number of hours between the last generator breaker opening and after first combustion turbine generator breaker closure which is typically indicated by telemetered or aggregated state estimator MWs greater than zero.

Maximum Daily Starts - The maximum number of times that a unit can be started in an operating day under normal operating conditions.

Maximum Weekly Starts - The maximum number of times that a unit can be started in one week under normal operating conditions (168 hour period starting Monday 0001 hour).

Maximum Run Time (hour) - The maximum number of hours a unit can run over the course of an operating day as measured by PJM's state estimator.

Cold/Warm/Hot Soak Time - The minimum number of hours a unit must run, in real-time operations, from the time after generator breaker closure which is typically indicated by telemetered or aggregated state estimator MWs greater than zero to the time the unit is dispatchable. For Combined Cycle units this is the minimum number of hours from the time just after the first combustion turbine generator breaker closure which is typically indicated by telemetered or aggregated state estimator MWs greater than zero and the time the unit is dispatchable.

Soak Time may include items such as the time necessary to alleviate temperature gradients across boiler or turbine components, the startup and stable operation of environmental equipment, water chemistry evaluations and holds, the maintaining of stable fuel/air ratios, the addition of incremental fuel related or other auxiliary equipment, the starting additional combustion turbines in a combined cycle, and the pressure matching of heat recovery steam generators.

Section 4: Overview of the PJM Synchronized Reserve Market

Welcome to the Overview of the PJM Synchronized Reserve Market section of the PJM Manual for Energy & Ancillary Services Market Operations. In this section, you will find the following information:

- An overview description of the PJM Synchronized Reserve Market (see "*Overview of PJM Synchronized Reserve Market*").
- A list of the PJM Synchronized Reserve Market Business Rules (see "*PJM Synchronized Reserve Market Business Rules*").

4.1 Overview of the PJM Synchronized Reserve Market

The PJM Synchronized Reserve Market provides PJM participants with a market-based system for the purchase and sale of the Synchronized Reserve ancillary service. Resource owners submit resource-specific offers to provide Synchronized Reserve, and PJM utilizes these offers together with energy offers and resource schedules from the Markets Gateway System, as input data to the Ancillary Service Optimizer (ASO). ASO then optimizes the RTO dispatch profile and forecasts LMPs to determine hourly commitments of the inflexible Synchronized Reserves. Although the ASO considers all available resources during its commitment process, the hourly commitments for Synchronized Reserve from the ASO are limited to inflexible resources only and may only represent a portion of PJM's Synchronized Reserve needs for the hour. In real-time PJM will jointly optimize the remaining RTO reserve needs simultaneously with energy and regulation and calculate a clearing price for Synchronized Reserve every 5 minutes based on the current system conditions. All 5 minute, real-time, Synchronized Reserve prices will be averaged to calculate the hourly Synchronized Reserve Market Clearing Price (SRMCP) that will be used for market settlement.

Inflexible resources are defined as those resources that physically require an hourly commitment due to soak time (if applicable) plus minimum run time constraints or staffing constraints. Inflexible resources include but are not limited to synchronous condensers that are operating in condensing mode solely for the purpose of providing Synchronized Reserves and Demand Resources that are prepared to curtail in response to a PJM reserve event.

PJM initially uses forecasted LMPs and resource schedules to estimate the amount of incidental Synchronized Reserve present on the PJM system due to economic dispatch and this capability is designated as Tier 1. Tier 1 is provided by any resource that is on line, following economic dispatch, and capable of increasing its output within ten (10) minutes following a call for a Synchronized Reserve Event. If the forecasted amount of Tier 1 estimated for a given duration is insufficient to meet the PJM Synchronized Reserve Requirement, PJM must commit resources to operate at a point that deviates from economic dispatch in order to provide the

remainder of the requirement. The extra capacity that must be committed is designated Tier 2. ASO will commit any inflexible resources that are forecasted to be economic to provide Synchronized Reserves during the operating hour. If the solution does not foresee the need to commit Tier 2 reserves or does not commit enough inflexible resources to meet the Synchronized Reserve requirement due to economics, PJM will jointly optimize the balance of the Tier 2 required in real-time with energy.

During each execution of RT SCED, any additional Synchronized Reserves will be committed that are required to meet the Synchronized Reserve requirement based on current system conditions while the IT SCED has the ability to project conditions further out into the future and make a recommendation to commit additional inflexible resources for reserves where they are economic. RT SCED has the ability to re-dispatch online generating resources to meet the Synchronized Reserve requirement in addition to committing additional flexible resources to provide Synchronized Reserves should they be economic. Prices for Synchronized Reserves will be calculated simultaneously with energy, regulation and non-synchronized reserve every 5 minutes by LPC. For each product, the 5 minute prices will be averaged over the operating hour to determine the hourly Synchronized Reserve Market Clearing Price (SRMCP) that will be used for market settlement.In the after-the-fact settlement, any resources cleared as self-scheduled to provide Synchronized Reserve are compensated at the hourly SRMCP. Any pool-scheduled resources selected to provide Synchronized Reserve are compensated at the higher of the hourly SRMCP or their real-time opportunity cost plus their Synchronized Reserve offer price. LSEs required to purchase Synchronized Reserve are charged the hourly SRMCP plus their percentage share of opportunity cost credits and Tier 1 credits.

4.2 PJM Synchronized Reserve Market Business Rules

4.2.6 Synchronized Reserve Commitment

60-minutes prior to the operating hour PJM will execute the Ancillary Services Optimizer (ASO). The ASO will jointly optimize energy, synchronized reserves, non-synchronized reserves and regulation based on forecast system conditions to determine an economic set of inflexible reserve resources to commit for the operating hour.

Any self-scheduled offers for synchronized reserves that are available at the time of the ASO execution will be assumed valid and committed for the hour.

Any reserve commitments on inflexible resources that are made will be locked for the operating hour and communicated via Markets Gateway.

The following reserve information will be posted to Markets Gateway 30-minutes prior to the operating hour:

- Reserve requirements for the RTO and each sub-zone
- Estimated Tier 1 for the RTO and each sub-zone

- Total synchronized and non-synchronized reserves available for the RTO and each sub-zone
- Total pool-committed inflexible reserves for the RTO and each sub-zone
- Total self-scheduled synchronized reserves for the RTO and each sub-zone
- Forecasted reserve shortage quantities for the RTO and any sub-zone
- Any additional Tier 2 synchronized reserves required in real-time in excess of the current Tier 1 on the system and the inflexible Tier 2 commitments will be committed via the joint optimization of energy, reserves and regulation.
- Additional Tier 2 synchronized reserve commitments made in real-time may be made on flexible reserves resources by the RT SCED application and inflexible reserves resources recommendations by the IT SCED application. Commitments on flexible reserves resources may change with each execution of the RT SCED application while commitments on inflexible reserve resources will respect the scheduled soak time (if applicable) plus the minimum run time of those resources.
- Flexible reserve resource Tier 2 commitments will not be posted to Markets Gateway but will be telemetered via ICCP or other communication protocol to resource owners.
- Additional inflexible resource commitments will be communicated to the resource owners via phone call and ICCP or other communication protocol.
- Any resource that is committed for Tier 2 when a synchronized reserve event occurs is obligated to respond for their commitment at the start of the event within 10 minutes.
- For the purpose of determining the most economic set of resources with which to meet the Synchronized Reserve requirement, PJM will calculate a resource-specific merit order price for each resource using the following methodology:
    - Resource merit order price ($/MWh) = Resource synchronized reserve offer + estimated resource opportunity cost per MWh of capability + energy use per MWh of capability + condense startup cost

Note: Condense startup cost is not included in the determination of the clearing price.

The resource synchronized reserve offer is that which is submitted by the owner via the Markets Gateway System by 1415 hours on the day preceding the operating day.

Estimated resource opportunity cost for condensing CTs is calculated as follows:

O.C.= [positive (forecast LMP – energy offer price)] x MW capability / synchronized reserve capability

Estimated resource opportunity cost for non-condensing resources is calculated as follows:

O.C. = |LMP – ED| x GENOFF, where:

LMP is the forecasted hourly LMP at the generator bus,

ED is the price associated with the set point the resource must maintain to provide its assigned amount of synchronized reserve, and

GENOFF is the MW amount of synchronized provided.

This formula is somewhat simplistic. The actual calculation is an integration that may be visualized as the area on a graph enclosed by the resource's price curve, the points on that curve corresponding to the resource's desired economic dispatch and the set point necessary to provide the assigned amount of synchronized reserve, and the LMP.

Energy use for each condensing resource is entered in MW by the owner via the Markets Gateway system as part of the synchronized reserve offer. Estimated energy use is calculated as part of the merit order price as follows:

E.U. = forecast LMP x energy use MW / synchronized reserve capability

For each of these calculations, forecast LMP is the result of the 1-hour look-ahead calculated in the ASO. Energy resources for which an energy offer is not submitted will be ineligible for opportunity cost credit.

When calculating the SRMCP in real-time, the actual LMP is used instead of the forecast LMP in the previous equations and calculated in the LPC engine. The 5-minute SRMCP is integrated to calculate an hourly value for settlements.

The opportunity cost for a Demand Resource is zero.

- PJM may call on resources not otherwise scheduled to run in order to provide synchronized reserve, in accordance with PJM's obligation to minimize the total cost of energy, operating reserves, regulation, and other ancillary services. If a resource is called on by PJM for the purpose of providing synchronized reserve, the resource is guaranteed recovery of synchronized reserve lost opportunity costs as well as start-up, no-load and energy costs. Please refer to Manual 28: Operating Agreement Accounting for additional settlements details.

- Due to transmission considerations on the PJM system, it is sometimes necessary to carry a minimum amount of synchronized reserve in specific areas in PJM such that loading 100% synchronized reserve will not result in an overload of any of the PJM transfer interfaces. The goal is to minimize the cost of synchronized reserve such that given current system conditions, the flow on binding transmission constraints is not increased after a synchronized reserve event is initiated and the associated response is achieved. Therefore, PJM clears the Tier 2 market based on this locational synchronized reserve requirement and calculates sub-zonal Tier 2 clearing prices. Whenever the locational synchronized reserve constraint is not binding, the clearing prices are equal. However, when more synchronized reserve is required in a given area than would have been assigned without this requirement, the clearing prices will separate. Resources will

be identified and receive the applicable clearing price based on their location with respect to the binding constraint(s). That is, resources for which synchronized reserve event response would help the constraint will receive the higher clearing price, whereas resources for which synchronized reserve event response would aggravate the constraint will receive the lower clearing price. Analysis to determine the location of generation and load buses with respect to the binding constraint is performed at least once with each quarterly network model update. The Mid-Atlantic Dominion sub-zone list resulting from this analysis can be found on the PJM Web site under "Mid-Atlantic-Dominion Subzone Bus and Resource List" at this location: http://www.pjm.com/markets-and-operations/ancillary-services.aspx. Resource owners should be aware if their resources are listed in the file and are therefore located in the MAD reserve subzone. Resources that do not appear in the list may respond only to PJM's request for Synchronized Reserve event in the RTO Reserve Zone. Resources that appear in the list may respond to PJM's request for Synchronized Reserve event in the MAD Reserve Sub-zone and the RTO Reserve Zone.

- Preliminary 5-minute market clearing prices will be made available in real-time through Data Viewer.

Section 11: Overview of the Day-Ahead Scheduling Reserve Market

Welcome to the Overview of the Day-Ahead Scheduling Reserve Market section of the PJM Manual for Energy & Ancillary Services Market Operations. In this section you will find the following information:

- An overview description of the PJM Day-ahead Scheduling Reserve Market (see "Overview of PJM Day-Ahead Scheduling Reserve Market").
- A list of the PJM Day-Ahead Scheduling Reserve Market Business Rules (see "PJM Day-Ahead Scheduling Reserve Market Business Rules").

11.2 PJM Day-Ahead Reserve Market Business Rules

11.2.2 Day-Ahead Scheduling Reserve Market Eligibility

Day-Ahead Scheduling Reserve Resources are defined as resources that meet the following eligibility requirements to provide Day-Ahead Scheduling Reserve:

Day-Ahead Scheduling Reserve Resources comprise of all those resources that can provide reserve capability that can be fully converted into energy within 30 minutes from the request of the PJM dispatcher at the time of the request and is provided by equipment which may not necessarily at the time of the request be electrically synchronized to the system.

A Day-Ahead Scheduling Reserve Resource may be:

- Equipment not electrically synchronized to the system. The equipment that generally qualifies in this category pumped hydro, industrial combustion turbines, jet engine/expander turbines, combined cycle and diesels; or
- Additional generating capacity that is synchronized to the grid, completed its soak time, and scheduled and can increase output in 30 minutes (including condensing mode and pumped hydro that is in pumping mode) to provide additional Day-Ahead Scheduling Reserve;

  or

- Load response resources must be registered in the Economic Load Response program, indicate that they can be dispatchable by PJM in real-time and be able to be reduced within 30 minutes.
- Load response resources that are considered "batch load" resources as defined in the section 1.3.1A.001 of the Operating Agreement, may participate in the Day-Ahead Scheduling Reserve market under the same conditions as exist for Synchronized

Reserve with respect to having already reduced prior to receiving a PJM dispatch instruction to do so. Such resources must remain off line for the duration of the PJM dispatch request in order to receive the Day-Ahead Scheduling Reserve market payment.

- Day-Ahead Scheduling Reserve Market offers may be submitted only for those resources located electrically within the PJM RTO. Resources that cannot reliably provide Day-Ahead Scheduling Reserve obligations in real time shall be excluded from the Day-Ahead Scheduling Reserve process. Such resources types includes, but are not limited to: Nuclear units, run-of-river and self-scheduled pumped hydro units, Wind units, Solar units, and non-energy resources such as batteries which do not have capability to provide the obligations of Day-Ahead Scheduling Reserve for entire hour. Owners of any specific resource(s) or these resource types may request an exception from the default non-eligibility to provide Day-Ahead Scheduling Reserve if they notify PJM that the resource(s) are able to reliably provide Day-Ahead Scheduling Reserve Obligation in real time.

- Resources may participate and be compensated in both the Day-Ahead Scheduling Reserve and Synchronized Reserve Markets. In addition, resources may participate and be compensated in both the Day-Ahead Scheduling and Regulation Markets However, since resources cannot participate in both the Synchronized Reserve and Regulation markets; no resources can participate in the Day-Ahead Scheduling Reserve, Synchronized Reserve AND Regulation markets and be compensated for all three.

- The following additional Demand Resources requirements must also be met in order to participate in the Day-Ahead Scheduling Reserve Market:

  - Demand resources' response controls must be approved by PJM prior to participation in the Day-Ahead Scheduling Reserve Market including ability to be dispatched by PJM's Security Constrained Economic Dispatch system.

  - Demand resources providing Day-Ahead Scheduling Reserve are required to provide telemetry that is capable of providing metering information at no less than a one minute scan rate.

- Metering information of demand resources is not required to be sent to PJM in real time. Daily uploads at the close of the next business day after the operating day if an event has occurred are sufficient, as the response evaluation is performed after the fact.

- Demand resources may be aggregated and offered into the PJM Day-Ahead Scheduling Reserve Market as one combined resource if the appropriate telemetry is provided for the aggregated resource.

- Demand resource participation will be limited to 25% of the RTO Day-Ahead Scheduling Reserve Requirement.

- Demand Resources will be allowed to participate in the Day-Ahead Scheduling Reserve Markets if approved by the appropriate Regional Reliability Council.

- Dynamic Transfer resources are eligible to provide Day-Ahead Scheduling Reserve as per Attachment F of Manual 12.