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1. How big is scope (in dollars) of Option 4-D from the matrix (DA OR with DASR net revenues)?

[From the IMM]: *We are working on this for the SOM and some of the other options presented at the meeting. As soon as we get the impact and verify the results, we'll be happy to present them. We did an analysis only for the hot week in July. The impact of doing the offset this way on the DA OR rate for July 16 was 62.2% (decrease), from \$0.646/MWh to \$0.244/MWh. This is not an issue most of the time because the DASR market price is practically zero for most of the year, but any time that changes (when DASR has a price) then this becomes a problem. We are still working on determining if this would be a net decrease/increase in credits or if it would be a different allocation (following the current rules).*

2. What are normal operating hours for staffing?

There is no specific PJM-wide definition for "normal operating hours". PJM documents the process for companies to provide this information (for reimbursement) in Manual 11, Attachment C:

If a unit uses a cost-based start-up and is manned above normal station manning levels at the direction of PJM and all units at the station do not run during the operating day, written confirmation of actual costs incurred due to such manning requirements can be submitted to PJM as cancellation fees per Section 1.10.2 of Schedule 1 of the PJM Operating Agreement and the parallel provisions of Attachment K Appendix of the PJM Tariff. Submittal should follow the "Credits for Canceled Pool-Scheduled Resources" timelines in Manual 28 (to be received within 45 days of date invoice was received by participant for the month in question). Request should include the normal station manning hours, the hours outside of normal station manning levels in which the unit was requested to be manned by PJM and the actual costs incurred for manning above normal station manning levels. The Balancing Operating Reserve credit for manning costs equals the actual costs incurred less any CT Lost Opportunity Credit in excess of day-ahead scheduled MW times the difference in real-time and day-ahead LMPs.

3. Can we make units marginal for reactive service (Joe Ciabattoni and Laura)?

PJM has already started working on this. In some cases, PJM can make these units marginal using closed loop interfaces to allow them to set price. Within the closed loop the Distribution Factors (DFAX) for units would be 1 and outside the loop would be zero. In certain situations we are able to use thermal surrogates to make units marginal for reactive issues. Generally this works best for localized voltage issues.

This was discussed during Adam's presentation at a previous meeting and it can be found here:

<http://www.pjm.com/~media/committees-groups/task-forces/emustf/20131220/20131220-item-02c-price-setting-option.ashx>

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4. Discuss process for change (notification timelines for non-filing changes)

Whenever PJM identifies market or operational issues that may be mitigated by modified modeling or operational strategies, PJM staff will provide notification to market participants with as much lead time prior to implementation as practicable, weighing the desire of market participants for advance notice with the potential impact and benefits of the modification.

5. Look at top 10 units to see if upgrades could alleviate reactive charges

- B0876 (Install 75 MVAR SVC at 138th St.) → +/-75 MVAR SVC
- B1899.2 (Install new variable reactors at Cedar Creek 230 kV) → 40 MVAR fixed reactor
- B1899.3 (Install new variable reactors at New Castle 138 kV and Easton 69 kV)
 - a. New Castle → 60 MVAR fixed reactor
 - b. Easton → 30 MVAR fixed reactors

6. When are credits paid for aborted start-up?

Cancellation credits are assigned to the day that the unit was scheduled to run for PJM.

An example scenario: PJM requests a unit with a 4 day start-up to start on Monday. On Wednesday, PJM cancels the unit due to changed system conditions. If the unit had continued to come online, it would have been available to PJM on Friday. In the case of this example, the credits would have been paid on Friday.

7. Find status of Cedar Creek RTEP upgrade (project B1899.2)

| Upgrade ID | Description | Driver | PJM Required In Service Date | PJM Revised In Service Date | TO Projected In Service Date | Actual In Service Date | Status Code | % Comp |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------------------|-----------------------------|------------------------------|------------------------|-------------|--------|
| b0876 | <ul style="list-style-type: none"> • Location: 138th St. • Task: Install • Equipment: Substation • Desc: Install 75 MVAR SVC at the 138th Street 138 kV bus • Voltage: 138 | N-1-1 Voltage | 6/1/2013 | 12/31/2013 | 3/31/2014 | | UC | 95% |
| b1899.2 | <ul style="list-style-type: none"> • Location: Cedar Creek • Task: Install • Equipment: Reactors • Desc: • Voltage: 230 | | 12/31/2013 | | 12/31/2013 | 10/10/2013 | Complete | 100% |
| b1899.3 | <ul style="list-style-type: none"> • Location: New Castle/Easton • Task: Install • Equipment: Reactors | | 12/31/2014 | | 12/31/2014 | | EP | |

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- | | | | | | | | | |
|-----------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|
| <ul style="list-style-type: none">• Desc:• Voltage: 138/69 | | | | | | | | |
|-----------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|

8. Uplift for emergency DR

The uplift charges for Emergency Demand Response are spelled out in Manual 28 and the tariff.

9. Understand dollar flow for emergency DR (include Distributed Gen that qualifies as emergency DR)

The participants who reduce load are paid for their actual kWh relief minus an adjustment for losses. This value is then multiplied by the appropriate zonal or aggregate RT LMP. Uplift is paid to a participant if the total hourly payments are less than the value of their standing offer price for actual kWh reductions. The participant is made whole up to the value of the offer for the actual reduction.

The total hourly charge for Emergency DR is allocated to market participants in proportion to their RT deviation from their net interchange in the day-ahead market when that deviation increases their spot market purchases or decreases their spot market sales. Any RT generation MW reduction as instructed by PJM is not included in the net interchange calculation.

Distributed generation that is not identified as a capacity resource is eligible to participate in the Emergency DR program and is treated the same as a load reduction within the program.

10. Put together chart for PJM (similar to "Figure 60" in Laura's presentation)

There is not a one-to-one comparison of PJM's data to the chart showing ERCOT's Reliability Unit Commitments.

11. Organize design components into 3 bucket

The matrix was updated to reflect the three buckets.

12. PJM to provide eLMP description

This was discussed and closed-out during the 2/19 meeting.

13. Education on LOC for dispatching up (Adam's proposed option)

Feedback was provided to the requester of this item.

Current provisions in the Tariff only permit the hourly compensation for Lost Opportunity Cost when a resource is "reduced or suspended" from where it otherwise would have operated economically. If a resource is asked to increase its output for a reliability reason, no similar hourly provisions exist. The extra incurred costs in this scenario are included in the Balancing Operating Reserve segment-based make whole payment methodology. PJM feels that a resource should be made whole on an hourly basis

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when that resource is asked to increase its output for a reliability reason similar to the settlement provisions when it is reduced.

14. PJM to report out on Reactive Settlement on 2/13 EMUSTF meeting

Reactive Charge adjustments totaling \$2.65 million (reduction in charges) for July and August 2013 were included in the January 2014 billing statement. Reactive Charge adjustments totaling \$26.5 million (reduction in charges) for September thru December 2013 will be included in the February 2014 billing statement.

15. Update presentation data with most current monthly data

PJM provided an updated PowerPoint deck which was posted to the 02/19/14 meeting materials.

<http://www.pjm.com/~media/committees-groups/task-forces/emustf/20140213/20140213-item-02b-2012-2013-uplift.ashx>

16. Break 2012 / 2013 DAOR and BOR into causal factors

This was discussed in the March 4 meeting.

17. Add details on design component in matrix (tab 2A)

The matrix has been updated (see Tab 2A).

18. Provide feedback to the MRC on manual 33 (data confidentiality)

Information Confidentiality design component was struck, based on feedback Mr. Anders received from the MRC. Possible future actions on this topic: create a new problem statement or request that the MRC modify the EMUSTF charter

19. Provide status update on non-reactive PJM changes

- PJM is currently developing additional closed-loop interface constraints in areas where there are resources receiving a large amount of make whole payments. As part of this process PJM is also trying to balance the impacts on FTR funding for the new closed-loop interfaces as well. None have been put into place yet but PJM is currently working to define them.
- The SENECA Interface went into production on February 1, 2014. During the time that the interface was being developed, PJM worked with the TO in the region on an alternative solution that involved changing the transmission system topology to minimize the need for reactive support in the area. This topology change went in place at the same time the interface went live which is why it has bound in a minimal number of hours. There will still be a need for reactive support in the area under certain operating conditions but it has been minimized.

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20. What are reasons for getting rid of Synchronous Condensing?

The reason is ambiguity and the different allocation that each reason has:

If synch condensing is for synch reserves the cost is allocated based on synch reserve obligation not met.

If synch condensing is for reactive the cost is allocated based on real-time load in the zone.

If synch condensing is for post-contingency the cost is allocated based on real-time load in the zone.

If synch condensing is for anything else the cost is allocated based on real-time load and real-time exports in the entire RTO.

21. Add formula details to proposals

This work is in-progress. It is currently on hold until it is decided which options will be moving forward.

22. Adjust Option F for the DAOR credit calc design component. Specifically, the concern raised was with the part: "*Offset DA OR with DASR net revenues. Do not offset BOR with DASR net revenue*"

No change was made to the solution option. Stakeholders are encouraged to add new options to represent their stance or proposed solution.

23. Add details to Option E for the DAOR Credit Calc design component

This change was made in the matrix

24. PJM to discuss 5a-E to make sure of implications. 5a-E reads: "*Make available to any unit that cannot meet its DA schedule due to PJM direction*".

This action item was discussed during the 3/13 meeting and has been closed.

25. Provide an assessment of the impact of the changes being proposed relative to DAOR.

PJM has completed this action item and posted the results on the April 8 EMUSTF webpage. The file can be found at: <http://pjm.com/~media/committees-groups/task-forces/emustf/20140408/20140408-da-credit-removal-simulation.ashx>

26. Provide education on Package D (rules, impact)

PJM provided education as part of the 3/13 meeting.

27. What is the synchronous condensing cost allocation method?

East Lake synchronous condensers do not participate in the market and are operated as transmission devices.

28. Reforward to group Adam's presentation on how close loop interfaces would work

This item is complete.

29. Publish spreadsheet w/ the BORCA allocation numbers

Per the Market Data Posting rules in Manual 33, PJM can only publish aggregate market data if it represents 4 or more market participants. There are many months where the totals represented in the graphs violates this criteria, therefore PJM is unable to publish the detailed data.

On 4/8, PJM took the action to review what of this data can be published externally. This item is once again open.

Information that is able to shown will be presented at the 4/17 meeting.

30. Publish list of causal factors (of uplift)

PJM typically sees uplift for the following reasons (listed by estimated order of magnitude).

1. Resources with large minimum output values committed for transmission constraints that are not needed above minimum.
 - a. Under the current rules these resources are not able to set LMP.
 - b. These resources can be for either reactive or thermal constraints.
2. For the above resources, minimum run times may be in excess of the time the resource is actually needed. Even if prices are set during the time the resource is needed, it will incur uplift payments in other hours where it is running just to meet its minimum run time.
3. Committing resources for the purpose of meeting system restoration requirements that are otherwise uneconomic.
4. Committing CTs in the Day Ahead Market and not running them in real-time when the Real-Time LMP exceeds that Day Ahead LMP. This is known as CT LOC payments.
5. Reducing a resource in real-time for a transmission constraint for which PJM does not accurately set LMP or dispatch. This is known as manual dispatches that typically are accompanied by an opportunity cost payment.
6. Commitment of resources in the Day Ahead Market based on economics that are subsequently not economic in real-time due to differences in the market outcomes.
7. The deployment of emergency demand response.

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8. Emergency purchases that are loaded and then become uneconomic during their minimum flow period.
9. Interchange during emergency conditions that is in excess of what was projected or planned for. This can result in low prices and high uplift.

31. What will the impact to uplift be as a result of topology changes (retirements, additions, etc.) over the 5 years?

As a general rule-of-thumb, PJM will not make forward projections on market costs, due to the many different factors that can influence these costs. Due to this stance, PJM is not comfortable providing a response to this question.

32. Add new meeting dates: May 1 and May 20 (dropping May 22 date)

The meetings have been scheduled.

33. Provide example and formula for LOC credit methodology (for when units are dispatched up manually)

If a pool-scheduled or self-scheduled resource is manually dispatched up and already on-line

- Hourly make-whole credit for the amount of the increase above the economic base point (Actual - LMP Desired)
- If pool-scheduled, also eligible for Balancing Operating Reserve credit.
- If self-scheduled, not eligible for Balancing Operating Reserve credit
- Hourly make-whole credit does not offset the Balancing Operating Reserve credit
- If manually dispatched up for reasons other than Reactive Services, allocated to Balancing Operating Reserves
- If manually dispatch up, hourly make-whole calculation should use the lesser of the cost or price schedule if on price schedule.

34. Proponents of packages need to write up a short executive summary explaining the objective of the proposal. This will be presented in the 4/8 meeting ~~Proponents of packages need to complete Tab 2b (solution details) in the matrix .~~

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Package proponents provided overviews of their packages. Two proponents also provided written summaries of their packages. The summaries are posted in the 4/8 EMUSTF meeting materials.

35. Integrate two new packages into matrix

This was completed (see the matrix for full details).

36. Provide more information on the decision to allocate additional gen called on during the RAC run (between reliability and deviations)

PJM posted a file (Item 02A – Generation Allocation) on the 4/8 meeting page to address this question. The file can be found at <http://www.pjm.com/~media/committees-groups/task-forces/emustf/20140408/20140408-item-02a-generation-allocation.ashx>

37. Daily/weekly/monthly correlation between total BOR and deviations for 2012/2013; 2013 and/or last six months (whatever is feasible).

| | Correlation BOR Deviation Credits and Deviations | Correlation BOR Reliability Credits and Load Plus Exports | Correlation Total BOR credits and deviations | Correlation Total BOR credits and Load plus exports |
|-------------------------------------------|--------------------------------------------------------------|-----------------------------------------------------------------------|-------------------------------------------------------|-----------------------------------------------------------------|
| Dec 2008 - Feb 2014 | 0.227742103 | 0.19526514 | 0.123366012 | 0.288058124 |
| By Year | | | | |
| 2009 | 0.35220728 | -0.021484404 | 0.292859331 | 0.466978463 |
| 2010 | 0.441113779 | 0.378840793 | 0.509097626 | 0.461032988 |
| 2011 | 0.517835678 | 0.20617955 | 0.494658601 | 0.507822423 |
| 2012 | 0.538576577 | 0.238893899 | 0.542030994 | 0.470310579 |
| 2013 | 0.334034881 | 0.307099321 | 0.363520828 | 0.405161977 |
| Jan&Feb 2014 | 0.65692048 | 0.53984578 | 0.628200626 | 0.59544129 |
| | | | | |
| | Correlation BOR Deviation Credits to Deviations | Correlation BOR Reliability Credits to Load Plus Exports | Correlation Total BOR credits and deviations | Correlation Total BOR credits and Load plus exports |
| By Season | | | | |
| Winter (Dec 2012/2013 - Feb 2013/2014) | 0.575895808 | 0.483993056 | 0.589520845 | 0.553749558 |
| Spring (Mar - May 2012/2013) | 0.362058918 | -0.203586466 | 0.479882705 | 0.205143912 |
| Summer (June - Aug 2012/2013) | 0.638855597 | 0.309456327 | 0.647975992 | 0.541697667 |
| Fall (Sep - Nov 2012/2013) | 0.183195735 | 0.311654851 | 0.181113325 | 0.489068768 |

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38. How cost allocations are made for export transactions for firm transmission rights

All exports, including those using Merchant Transmission Facilities, are included in Balancing Operating Reserve charges. The only exceptions are dynamically scheduled export transactions.

39. Determine where DR sits in the BOR charges applied flowchart (slide 18)

DA cleared load response bids are included in the total “DA load” for the LSE associated with the DA demand response bid. DA load is included in the “Bucket 1” category of slide 18.

When economic load response is billed, dispatchable economic load reduction resources that follow dispatch are not assessed balancing Operating Reserve deviations. Economic load reduction resources that do not follow dispatch are assessed balancing Operating Reserve deviations. In the case where the Market Participant deviates by more than twenty percent of the day-ahead committed bid or the desired amount, the Market Participant will incur Balancing Operating Reserve charges:

From Manual 28: Section 11.2.3

*Abs[(Actual MWh relief provided * (1- EDC loss de-ration factor) * Energy Loss factor) – Desired MWh] * RTO Balancing Operating Reserves Deviation Rate + Abs[(Actual MWh relief provided * (1- EDC loss de-ration factor) * Energy Loss factor) – Desired MWh] * Locational Balancing Operating Reserves Deviation Rate (East or West depending on zone)*

The charges calculated for Real-time load response participants that deviate are allocated as credits to all participants that paid for Balancing Operating Reserve charges according to their deviation ratio shares. The charges calculated for Day-ahead load response participants that deviate are allocated as credits to the LSE associated with the load response registration.

40. Look at which causes of uplift (documented in Action Item Response #30) each proposed package will and will not address.

PJM will work with EMUSTF participants to provide these details for each proposed package.

This additional detail was added to the Executive Summary of PJM’s proposed package and posted on the 4/17/14 EMUSTF page.

41. Incorporate new package submissions into matrix.

As of 4/9, all potential packages have been incorporated into the matrix.

42. Check with PJM staff on the status of DARCA units that are brought on for reactive and may drift back and forth between reactive and economic

Currently if a unit is on for reactive it is made whole hourly. When the unit is economic, there is no make whole on incremental cost. When the LMP is less than incremental cost, the hourly make whole

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cost is paid for by the zones that benefit. Also, if the unit still requires make whole outside of the reactive make whole and LMP revenue (to cover start and no load cost) it is allocated like balancing operating reserves (east/west/RTO).

The Day Ahead Reliability and Reactive Cost Allocation group had no consensus on how to calculate or allocated reactive service credit.

43. What needs to change to make PJM proposal (B) a viable solution? The IMM may have to adjust their relevant package (F?) to also make it viable.

The matrix was updated in response to this request.

44. What design components within packages A and B would have the most impact on the BORCA bar chart (from Suzanne's presentation on 3/13)

See file <http://www.pjm.com/~media/committees-groups/task-forces/emustf/postings/20140417-pjm-phase-1-solution-proposal-details.ashx> for details on impact.

45. Would PJM be willing to incorporate the IMM's (pkg E and F) option for 2-E (Objective Function: Transmission Planning)?

The IMM's option has been incorporated into Packages A & B.

46. PJM to talk through what has changed since the BORCA settlement (including DR and UTCs)

PJM has compiled a document that contains the changes over time since the BORCA settlement. The file is posted in the 5/20/14 meeting site.

47. PJM to provide data showing uplift allocated to load vs. uplift allocated to deviations and how it has changed over time

Please see the Monitoring Analytics presentation from the May 1 meeting:

<http://www.pjm.com/~media/committees-groups/task-forces/emustf/20140501/20140501-or-allocation-education.ashx>

Slides #3 and 9 cover the Day-ahead Operating Reserve charge allocation. Slide #17 covers the Balancing OR allocation to reliability and deviations since Jan 2009. The Balancing charge rates by region and reliability and deviations categories are on slides 25 – 30..

48. Post the updated executive summary (with 4/17 materials)

This was posted on 5/1/14.

49. Highlight the differences between package A, B, E and F

This was presented at the 5/1/14 EMUSTF meeting. The matrix is posted at:

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<http://www.pjm.com/~media/committees-groups/task-forces/emustf/20140501/20140501-emustf-phase-1-package-comparison.ashx>

50. Provide details on how pricing would be developed for Package I

Today, we are forcing Black Start and Reactive units into the DA. I suggest we use that procedure same procedure for all units we know will run DA.

51. Update package comparison matrix for Transmission Planning Objective function. PJM and MA to discuss "Intra-hour LOC". Also need to include package A in the comparison.

The matrix has been updated, based on discussions between PJM and MA.

52. Post executive summaries to the top-level of EMUSTF site

This is complete

53. Repost most current charter to the website

This is complete

54. What is the difference between DA and RT price and volume of virtual transactions?

Please see <http://www.pjm.com/~media/committees-groups/committees/mc/20141027-webinar/20141027-item-04-utc-reduction-impacts.ashx> for a related presentation that provides this information.

55. Add energy prices to slide 8 on Adam's presentation from 7/17 meeting

This is complete. See the updated presentation entitled "Item 04c – 2014 Uplift Reduction.ppt" on the 8/28/14 EMUSTF meeting page.

56. Would any of the phase 1 packages have had a significant impact on uplift during the January 2014 polar vortex event?

No. The uplift associated with the January polar vortex event was caused by extreme gas prices and extreme weather, not how generation units get paid or uplift is calculated.

57. Provide education on PS/ConEd wheel. Education should include guiding documents, who is responsible, etc.

PJM provided education on 12/11/14.

58. Provide education on the model (price volatility constraint) associated with IT SCED change (or is it due to operator constraint). If the latter, is it coincident with having better model and better data?

PJM Staff met with the member and clarified this request. Based on that conversation, the question has been removed from the action item list.

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59. Is there a way to identify the uplift costs associated with our operations in support of the wheel?

Likely not. It's arguable that the actions we take in northern PS are solely for the purpose of the wheel. We can tally the total dollars for the wheel units and say that's the total cost of controlling everything going on up there but to associate that solely to the wheel is stretch. It's also market sensitive.

60. What is the relationship of uplift costs to Market-to-Market?

Probably little or none. Most of our generation is constrained off for MISO constraints so we're not committing generation for them. If anything we're decommitting it.