Advanced Scheduling Proposal

MIC

August 5, 2026

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Advanced Scheduling

- **PJM has historically scheduled units in advance of the day-ahead energy market when steam units with long lead times are needed for reliability (typically related to transmission constraints including low voltage but also during conservative operations).**
- **Post Winter Storm Elliott in 2022, PJM has increased the use of this process to address historical poor generation performance during extreme winter days. Generation performance improves when units are:**
  - **Committed before cold weather arrives.**
  - **Committed while gas trading is liquid.**

Advanced Scheduling

- **In order to manage these weather related risks, PJM is committing units in advance of the DAM.**
  - **For all thermal units using fossil fuels, these commitments are a day or days in advance of the DAM. The goal is to have these units online before the cold temperatures arrive in order to avoid freezing or other unexpected issues.**
  - **For all gas units, these commitments are a day or days in advance of DAM, depending on how natural gas is trading (i.e. single day or weekend package). The goal is to have these units purchase natural gas when the market is liquid.**

Advanced Scheduling

- Ideally, PJM would leave these risks to generation owners. That was the premise behind Capacity Performance.
  - Inventive based on high PAI penalties instead of clear operational requirements.
- The reality is that PJM will continue to do advanced scheduling to minimize winter performance risk.
- Both the IMM and PJM agree that the advanced scheduling process needs transparency.
- These areas include communication process, offers used for commitment evaluation, use of operating parameters, and financial consequences of commitment.

Goal

- The goal is to have a transparent process in which units are committed economically based on the known constraints and explicit commitment instructions are given.
- Areas of interest:
  - Communications
  - Tools and inputs
  - Offers and FCPs
  - Uplift
  - Transparency
  - Settlements

COMMUNICATIONS

Communications

- **PJM will notify in advance when these commitments will be made based on system assessment.**
  - **New emergency procedure to provide notification.**
  - **The alert will include a deadline by which units' information must be updated.**
  - **A second notification will be sent when commitments are posted.**
- **PJM will provide electronic commitments (same as DA).**
  - **The commitments will include start and end times.**
  - **The commitments will include hourly MW profile.**
  - **Information will be posted in Markets Gateway.**

INPUTS AND TOOLS

Inputs and Models

- **Advanced unit scheduling will be the result of a commitment tool that looks ahead multiple days.**
- **Objective function is to minimize production cost using:**
  - **PJM's load forecast**
  - **Generation availability from Markets Gateway**
  - **Generation at risk**
    - Natural gas procurement
    - Cold weather temperature limits
  - **Interchange assumptions**
  - **Demand response availability**

Generation at Risk

- **Units at risk will receive advanced commitments.**
- **Categories of risk:**
  - **Cold Weather Operating Risk: Units with cold weather start and operating limits above forecasted temperatures will be considered at risk.**
  - **Gas Procurement Risk.**
    - Units that indicate to PJM that they are at risk of lack of fuel if not committed prior to the Day-Ahead Energy Market and/or
    - Units that PJM determines are at risk due to historical performance and system conditions.

Generation at Risk

- Units will indicate to PJM that they are at risk (self identified) via eDART (prior to the start of the winter season) and again in Markets Gateway (when the advanced scheduling process is triggered).
- PJM will evaluate all gas units and units that are expected to face temperatures below their cold weather operating limits.
- PJM will determine which units will receive advanced commitments based on PJM’s risk assessment.
- Units at risk statistics (e.g. number and MW) will be posted after the fact.

Offers

- **PJM will need offers before the DA deadline to do an economic evaluation of which units at risk will be committed in advance of the DAM.**
- **Today, generators submit nonbinding offers for the next seven days.**
- **Units that self identify as at risk will have to submit an Indicative Offer.**
- **Indicative Offer: Offer estimate to be used by PJM for advanced unit scheduling.**
- **Uplift payments will be capped based on the Indicative Offer.**

Offers

- **Units identified as at risk by PJM (not self identified) may, but do not have to, submit Indicative Offers.**
  - **If an Indicative Offer is not provided, unit will be placed at the end of the supply stack.**
  - **If an Indicative Offer is not provided, uplift remains status quo (committed or final offers).**
- **Units not identified as at risk will not receive advanced commitments, but may submit Indicative Offers.**
  - **If Indicative Offer is not provided, PJM will use unit's nonbinding seven day offer forecast.**
  - **In any case, uplift remains status quo.**

Offers Summary

- **Unit at risk (self identified): Must provide Indicative Offer.**
- **Unit at risk (identified by PJM): May provide Indicative Offer, but if not, will be part of the group of units committed last.**
- **Unit at risk (cold operating limit): May provide Indicative Offer, but if not, will be part of the group of units committed last.**
- **Unit not at risk: May provide Indicative Offer, but if not, PJM will use nonbinding seven day offers in Markets Gateway.**

Operating Parameters

- Units committed in advanced will be allowed to increase their economic minimum to match their advanced scheduling profile.
- Gas packages will not be modeled as multiday minimum run times.
- If necessary, units will be committed for specific days.
- Pipeline ratable takes will continue to be enforced via PLS exceptions.

Other Inputs

- **Interchange: Any delisted capacity (capacity that has been committed outside of PJM) will be assumed to be exported.**
- **DR: Estimated response submitted by CSPs in DR Hub based on actual reductions during comparable weather.**

FUEL COST POLICIES

FCP Changes

- All units committed in advance of the DAM must reflect actual gas price paid by units in their offers prior to start of operating day.
- Volumes:
  - Actual gas price paid must be for the volume purchased to meet PJM's advanced commitment MW.
  - Any uncommitted MW can continue to reflect the existing FCP method.
  - For example, unit is committed to run 24h at eco min. Actual price is $15/MMBtu. Incremental gas can be bought at $25/MMBtu. Offer up to eco min would be based on $15/MMBtu gas. Offer beyond eco min can be based on $25/MMBtu gas.

UPLIFT

Uplift

- For units committed in advance of the DAM, uplift will be calculated for the entire commitment period (no longer daily or segmented).
  - This could include multiple days.
- All uplift will be allocated as reliability charges. Reliability charges are allocated to real time load plus exports.

Unrecovered Gas Costs

- PJM will provide MW commitments, as done DA today.
- Units will have the ability to:
  - Set eco min to this MW level, or
  - Leave eco min flexible.
- PJM can request units to operate below this eco min and/or decommit.
- These actions will be taken for reliability only (e.g. emergency min events, constraint management) and not based on economics.

Unrecovered Gas Costs

- **When reduced or cancelled by PJM for reliability, Market Sellers will provide PJM/IMM calculations of any resultant fuel loss calculations including supporting documentation.**
- **PJM/IMM will review information.**
- **Only transactions that were the result of PJM's advanced scheduling and PJM's reduction/cancellation instruction will be included.**
- **The final value will be included as a cost component in the uplift calculation.**

Committed Offer

- **Uplift is limited to the lesser of the Committed Offer and Final Offer.**
- **Committed Offer:**
  - **The Indicative Offer (for self identified units), if provided, in effect at the time the resource receives the advance scheduling instruction, or**
  - **The Day-Ahead Market offer, if an Indicative Offer was not provided.**

TRANSPARENCY

Data Posting

- **IMM/PJM will post data on commitments from advanced scheduling, including:**
  - **Number of units**
  - **Energy (MWh) by hour**
  - **By reason committed in advance of the DAM:**
    - Transmission constraints
    - Conservative operations
- **Data posting will not be subject to confidentiality limitations (three owners or less).**

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