Gas Market Coordination in PJM Markets

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Day-Ahead Market Timeline

Throughout operating day PJM continually re-evaluates and sends out individual generation schedule updates, as required.

**Day 1: 6PM**  
- Bidding process starts

**Day 2: 12PM**  
- Bids are made and submitted
- All bids received

**Day 2: 4PM**  
- Market closed

**Day 2: 6PM**  
- Final bids submitted
- Re-bidding begins
- PJM posts DA LMP
Electric & Gas Day Timeline

Day-ahead bidding

Re-bidding

Midnight  Noon  6:00 p.m.  Midnight  Noon  6:00 p.m.  Midnight  Noon  6:00 p.m.  Midnight

ELECTRIC DAY (-2)  ELECTRIC DAY (-1)  ELECTRIC DAY

GAS DAY (-2)  GAS DAY (-1)  GAS DAY

Timely nomination  Evening nom.  Intraday nomination 1  Intraday nom. 2
• Operational day differences
  – Procure gas for two gas days for one electric day
  – Generator may need to sell gas if not picked up to run on the electric day
  – Generators must balance gas deliveries and could be forced to derate during the start of the morning peak to balance gas deliveries.

• Nominations
  – Units must nominate gas transportation (timely) before knowing the day-ahead awards
  – Interruptible transportation, even if they nominate in the timely schedule, can have their nominations eliminated if firm transportation customers elect to use their capacity in later nomination periods (except for nominations made in the Intraday 2 period)
  – Interruptible transportation is harder to get or can be unavailable in later nomination cycles, after a generator has been scheduled to run in the day-ahead market.
• **Generation Offer Types**
  - Market-based offer
    - Start up and No-Load costs can be market-based or cost-based
    - Cost-based Start and No-Load costs can be updated daily
    - Market-based Start and No-Load costs can be updated every 6 months
    - Market-based Parameter Limited used in Max Generation Emergencies
  - Cost-based offers (up to 78)
    - Operating parameters are limited to the Parameter Limited Schedule (PLS)
    - Can be used to capture the variability in fuel costs

• Generators are run on market-based offer unless the unit fails the test for Market Power called the Three Pivotal Supplier (TPS) Test
  - If generator fails TPS test – PJM commits the unit on the cheapest offer from the available market-based and cost-based offers
PJM Day-Ahead Market – Gas-Fired Generator Scenarios

- Committed in Day-Ahead Market (gas purchased) – Runs in Real-Time
  - Fails TPS DA – the unit is run on cheapest available schedule
- Committed in Day-Ahead Market (gas not purchased) – Runs in Real-Time
  - Fails TPS DA – run on cheapest available schedule
  - Unit must buy gas on spot market
  - Spot gas prices can be higher or lower than gas used in calculation of offers
- Not committed in Day-Ahead Market (gas purchased)
  - Generator can make changes to its market and cost-based offers and rebid between 4PM and 6PM
  - If generator is not committed in the rebid period the unit must sell off gas, self schedule, or wait to see if committed in real time

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PJM Real Time Market – Gas-Fired Generator Scenarios

• Awarded Day-Ahead Market (gas purchased)
  – In Real Time runs longer than DA schedule, thus must procure fuel:
    • Unit can recover fuel costs
    • PJM Manual 11: Attachment C
  – In Real Time runs less than DA schedule (by PJM direction):
    • Unit is paid difference between DA LMP and RT LMP
    • Gas Balancing charges are not eligible for balancing operating reserve payments

• Not Awarded Day-Ahead Market (gas purchased) but called in Real-Time
  – Passes TPS – Generator runs based on market schedule
    • If unit cannot run, must take an outage, which will affect EFORd (Capacity Revenues)
  – Failed TPS – Generator can pick their available cost schedule and will be compensated the lower of their market-based offer or the available cost offer
Unit offers into the DAM

Gas purchased
- Unit is committed
  - Unit is picked up in re-bid period
    - Unit can self schedule (PriceTaker)
      - Unit passes TPS: market-based schedule
  - Unit is not picked up in re-bid period
    - Unit may need to sell gas (may incur ballancing charges)
      - Unit fails TPS: lowest cost schedule

Gas not purchased
- Unit is committed: Unit must buy spot gas
  - Unit is picked up in re-bid period: Must buy gas
- Unit is not committed
  - Unit is picked up in re-bid period