Settlement Education and Implications for Consideration in Circuit Breaker Design

Rebecca Stadelmeyer
Market Settlement Development
EPFSTF
October 27, 2021

Objectives

- Provide a high-level overview of how the energy and ancillary service markets settle
- Show how shortage pricing impacts different entities
- Show how the flow of money could change under different circuit breakers

General Concepts

- Two Settlement Market (for energy and ancillary services)
  - Day-ahead cleared quantities are settled at DALMP/DAMCPs
  - MW deviations from DA are settled at the RTLMP/RTMCPs
- Capacity Commitments
  - Obligated to perform when requested and can be a benefit (bonus) or a liability (penalty) to a capacity resource
  - Stop-loss provision effective
- Forward Hedges
  - Creates an energy position (long or short) for a market participant outside of PJM
  - Typically settles using the PJM DALMP or RTLMP
- Circuit Breakers
  - Impact is highly dependent on implementation
  - Can mitigate risk for some and possibly increase it for others
  - May result in undesirable incentives if not implemented

Capacity Performance Stop-loss Provision

- Only resources with Capacity Performance (CP) commitments are assessed Non-Performance Charges
- Stop-Loss = 1.5 * Net CONE * Committed UCAP * 365 days
- Benefits under-performing resource: no longer pays Non-Performance Charge
- Disadvantages over-performing resource: smaller bonus payment because bonus payment pool is smaller

Two-Settlement Market

- Day-ahead Settlement
  = DA MW * DA LMP
  - Charge = buying MW from PJM
  - Negative Charge (Credit) = selling MW to PJM
- Balancing Settlement
  = (RT MW – DA MW) * RT LMP
  - Charge = when an entity buys MWs in RT
    - Short to DA commitment
  - Negative Charge (Credit) = when an entity sells MWs in RT
    - Long to DA commitment

*** LMPs are presumed to be greater than $0

Two-Settlement Market Examples

- Supply – Long to DA Commitment
  - DA Scheduled = 200 MW; RT Actual = 205 MW
  - DA LMP = $20; RT LMP = $25
  - DA Energy Market
    = (200 MW * $20) = $4,000
    – shows as negative charge or credit on bill
  - Balancing Energy Market
    = ((205 MW – 200 MW) * $25) = $125
    – shows as negative charge or credit on bill

- Supply – Short to DA Commitment
  - DA Scheduled = 200 MW; RT Actual = 100 MW
  - DA LMP = $20; RT LMP = $25
  - DA Energy Market
    = (200 MW * $20) = $4,000
    – shows as negative charge or credit on bill
  - Balancing Energy Market
    = ((100 MW – 200 MW) * $25) = $2,500
    – shows as charge on bill

- Load – Long to DA Commitment
  - DA Demand = 100 MW; RT Actual = 110 MW
  - DA LMP = $20; RT LMP = $25
  - DA Energy Market
    = (100 MW * $20) = $2,000
    – shows as charge on bill
  - Balancing Energy Market
    = ((110 MW – 100 MW) * $25) = $250
    – shows as charge on bill

- Load – Short to DA Commitment
  - DA Demand = 100 MW; RT Actual = 95 MW
  - DA LMP = $20; RT LMP = $25
  - DA Energy Market
    = (100 MW * $20) = $2,000
    – shows as charge on bill
  - Balancing Energy Market
    = ((95 MW – 100 MW) * $25) = $125
    – shows as negative charge or credit on bill

Two-Settlement Market Examples (cont)

- Using own supply to cover own load and generator loss in RT
  - DA Scheduled = 200 MW; DA Demand = 200 MW
  - RT Actual = 100 MW; RT Actual = 205 MW
  - DA LMP = $20; RT LMP = $25
  - DA Energy Market

    = (200 MW * $20) + (200 MW * 20) = $0

    ($4,000 for supply + $4,000 for demand)

    – shows as charge on bill
  - Balancing Energy Market

    = ((100 MW – 200 MW) * $25) + ((205 MW – 200 MW) * $25) = $2,625

    ($2,500 for short supply + $125 for long demand)

    – shows as charge on bill

Two-Settlement Market - Observations

- Real-time Energy Market short positions = Balancing Charge $
  - Generally disadvantaged by shortage pricing when RTLMP > DALMP
  - Load that has under-scheduled in DA and needs more in RT
  - Suppliers that are short on their DA commitment
  - These entities would generally benefit from the circuit breaker
- Real-time Energy Market long positions = Balancing Credit $
  - Generally advantaged by shortage pricing when RTLMP > DALMP
  - Load that has over-scheduled in DA and needs less in RT
  - Suppliers that are long on their DA commitment
  - These entities would generally be disadvantaged from the circuit breaker
- The degree to which these entities benefit or disadvantaged depends on level to which prices are cut and the size of the short/long positions

Capacity Performance Assessment Interval

- Expected Performance = Balancing Ratio * Committed Capacity
  - Bonus Payments = MAX[(Actual Performance – Expected Performance),0] * Bonus Rate
  - Non-Performance Charge = MAX[(Expected Performance – Actual Performance),0] * Non-Performance Charge Rate
- Performance Assessment Interval (PAI) settlement is calculated separately from energy and ancillary services and does not impact those positions/dollars
- Load is not assessed PAI settlements

Performance Assessment Interval Examples

- Supply – Long to DA Commitment
  - DA Scheduled = 200 MW; RT Actual = 205 MW
  - Expected Performance = 175 MW
  - DA LMP = $20; RT LMP = $25
  - Bonus Rate = $250
  - DA Energy Market
    = (200 MW * $20) = $4,000
    – shows as negative charge or credit on bill
  - Balancing Energy Market
    = ((205 MW – 200 MW) * $25) = $125
    – shows as negative charge or credit on bill
  - Capacity Performance Bonus Payment
    = ((205 MW – 175 MW) * $250) = $7,500
    – shows as credit on bill

- Supply – Short to DA Commitment
  - DA Scheduled = 200 MW; RT Actual = 100 MW
  - Expected Performance = 175 MW
  - DA LMP = $20; RT LMP = $25
  - Non-Performance Charge Rate = $250
  - DA Energy Market
    = (200 MW * $20) = $4,000
    – shows as negative charge or credit on bill
  - Balancing Energy Market
    = ((100 MW – 200 MW) * $25) = $2,500
    – shows as charge on bill
  - Non-Performance Charge
    = ((175 MW – 100 MW) * $250) = $18,750
    – shows as charge on bill

Forward Hedges

- Companies have different risk profiles, product portfolios, and stockholders
  - Utilize forward hedges - contracts are created between two entities outside of PJM and PJM is not one of the entities
  - Hedges can be physical or financial
- PJM settles internal bilateral transitions (IBT) through InSchedule
  - Contract price is settled outside of PJM between the entities

Next

- Circuit breaker will have various benefits and disadvantages based upon many variables
  - current and forward positions
  - risk profile
  - priorities
  - triggers
  - duration
  - money flow
  - secondary settlement impacts

Contact

Facilitator:
Susan Kenney

Susan.Kenney@pjm.com

Secretary:
Andrea Yeaton

Andrea.Yeaton@pjm.com

SME/Presenter:
Rebecca Stadelmeyer

Rebecca.Stadelmeyer@pjm.com

Member Hotline

(610) 666-8980

(866) 400-8980

custsvc@pjm.com

Energy Price Formation Senior Task Force, Settlement Education and Implications