PJM Circuit Breaker Design

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Disclaimer

- This is an initial proposal to generate discussion.
- PJM is open for suggestions in any aspects of this initial proposal.
- PJM would like input from stakeholders to refine the proposal to meet the needs of stakeholders.

PJM's Objectives for the Circuit Breaker

- Maintain the overall integrity of the market by limiting participants' exposure to sustained high prices which could threaten the financial viability of prudent market participants.
- Protect the value of scarcity pricing signals by not capping prices prematurely.
- Do not adversely impact the dispatch solution.
- Allow prices to reflect cleared generator offer levels to limit excessive uplift payments.
- Triggers should be transparent and bright line. They should not rely on PJM judgement or complex analysis.
- Keep the process and implementation simple.

Application of the Circuit Breaker Logic

- Apply circuit breaker in Pricing run solution of ITSCED, LPC, and DA market clearing engines (MCE)
  - Dispatch run solution would not apply circuit breaker logic
    - Applying CB in the dispatch run will limit the actions the MCE can use to maintain reliability
    - Not applying the CB in the dispatch run allows MCEs to re-enforce dispatcher decisions to maintain reliability

Circuit Breaker Trigger

- The Circuit Breaker trigger is dependent on a pricing level experienced over a specified time duration.
- Pricing Level
  - DA or RT solving with the active sub-zone SRMCP ≥ X

    (X = $8,000/MWh or $10,000/MWh under consideration)
  - SRMCP ≥ X represents some of the following conditions
    - Voltage Reduction action or Manual Load Dump action
    - Shortage or close to shortage conditions in multiple products

Activation of Circuit Breaker

- Time Duration
  - Real Time (RT): Subzone SRMCP ≥ X for a total number of 5 minute pricing intervals ≥ I in an operating day or across two consecutive operating days.
    - Intervals can be consecutive or non-consecutive
  - Day Ahead (DA): Subzone SRMCP ≥ X for a total number of hours ≥ H in a market day or across two consecutive market days.
    - Hours can be consecutive or non-consecutive
  - Activation of the Circuit Breaker in the DA and RT markets are independent of each other.

Potential Time Duration Calculation

- Strike the balance between protecting the value of scarcity price signals and limiting exposure to sustained periods of higher prices.
- Based on Net CONE of ~$96,000/MW-Year
  - If trigger price is $8,000/MWh – Duration is 12 hours
  - If trigger price is $10,000/MWh – Duration is ~10 hours
- Based on 1.5 x Net CONE of ~$144,000/MW-Year
  - If trigger price is $8,000/MWh – Duration is 18 hours
  - If trigger price is $10,000/MWh – Duration is ~14 hours.

Potential Pricing under Circuit Breaker

- Max Reserve MCP of $2,000/MWh if short
- Results in a Energy Component of LMP of $4,000/MWh (not considering transmission constraint impact)
- Total LMP of a given pricing node (pNode) may be greater or less than $4,000/MWh depending on marginal loss and congestion contributions.

Circuit Breaker Pricing Methodology

- When Circuit Breaker is Triggered
  - PJM will maintain pricing of the RTO SR requirement utilizing a penalty of $2000/MWh on the ORDC for the market in which the circuit breaker is triggered.
  - All other reserve products in the RTO and active reserve sub-zone will be disabled or cleared utilizing a penalty of $0/MWh on their respective ORDC for the market in which the circuit breaker is triggered.
    - Applies to Sub-zone SR, Sub-zone PR, Sub-zone SecR, RTO PR, and RTO SecR

Termination of Circuit Breaker

- Termination of the Circuit Breaker is dependent on a pricing level experienced over a specified time duration.
- Price Level
  - RTO SR MCP < $2000/MWh
- Time Duration
  - H consecutive hours for DA or I consecutive intervals for RT
    - Consecutive intervals are used to prevent premature termination of the circuit breaker

    (H and I = ? No more than 24 hours? 2 days?5 days)

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