Providing Regulation in PJM
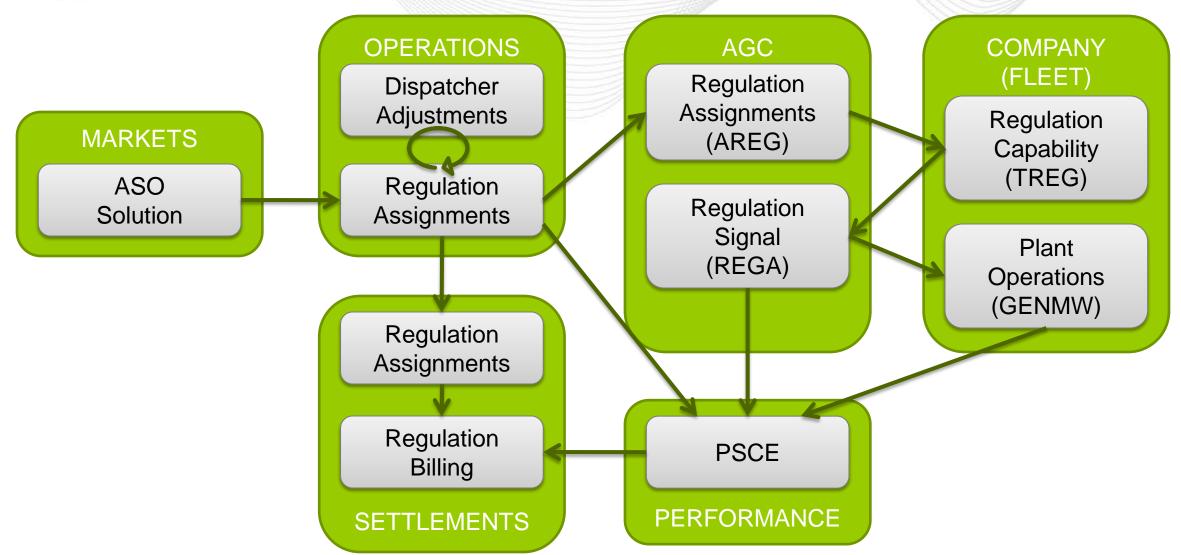
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Providing Regulation, Today

- Clear the Market
  - Regulation Requirement
  - Benefits Factor (BF)
  - Effective MW
  - Regulation Assignments (AREG A & D)
- Generate the Signals
  - Area Control Error (ACE)
  - ACE Correcting Signal (ACS)
  - Total Regulation Capability (TREG A & D)
  - Regulation Signals (REG A & D)

- **Provide the Service**
  - Automatic Generation Control (AGC)
- **Pay for Performance**
  - Performance Score Calculation Engine (PSCE)
  - Signal Mileage
  - Mileage Ratio
  - Regulation Market Clearing Price (RMCP)
  - Market Settlements (MSRS)

- $/MW offers submit by rebid period close
  - Currently by 18:00 prior to operating day
- MW offers & availability in by 1 hour prior to operating hour
- Require 700 effective MW on-peak, 525 effective MW off-peak
- Rank the offers, calculate the Benefits Factor for RegD
- Calculate the effective MW based on historical performance, Benefits Factor, raw MW offers
- Assign Regulation (AREG) until requirement is met
- Post Assignments to eMKT upon ASO approval

In the Operating Hour, PJM will

- Adjust assignments if necessary, coordinating with members
- Transfer assignments to member via ICCP/DNP3 in real time
  - Member replies with fleet Total Regulation (TREG) capability
- Calculate RTO Area Control Error from ties, frequency
- Calculates regulating signals using controller, tuning parameters
  - Proportionally allocate RTO signal to fleet in TREG ratio share
- Transfer fleet regulation signals to member via ICCP/DNP3

In the Operating Hour, member will

- Proportionally allocate the fleet regulation signal to individual resources in AREG ratio share, unless performance grouped
- Adjust desired output of resource to match economic basepoint plus individual share of regulation signal
  - Economic Basepoint is the RTSCED economic desired
- Telemeter actual output to PJM via ICCP/DNP3 in real time

In the operating hour, PJM will

- Calculate a mileage by signal type, and ratio between types
- Calculate RMCPs, including the real-time LOC from energy LMP

After the operating hour, PJM will

- Calculate a performance score using archived telemetry
  – Post the performance score to eMKT upon calculation
- Settle the regulation service credits and charges
  – Potential make-whole accounting for shoulder hour
  – Performance score scales the credit based on how the individual resource followed the signal they were given

- Hand-shake process ensures members know assignments and PJM knows regulation capability / reserve

- Proportional response from resources keeps the process simple, measurable, timely and scalable

- Documented and open performance scoring