Soak Time Implementation

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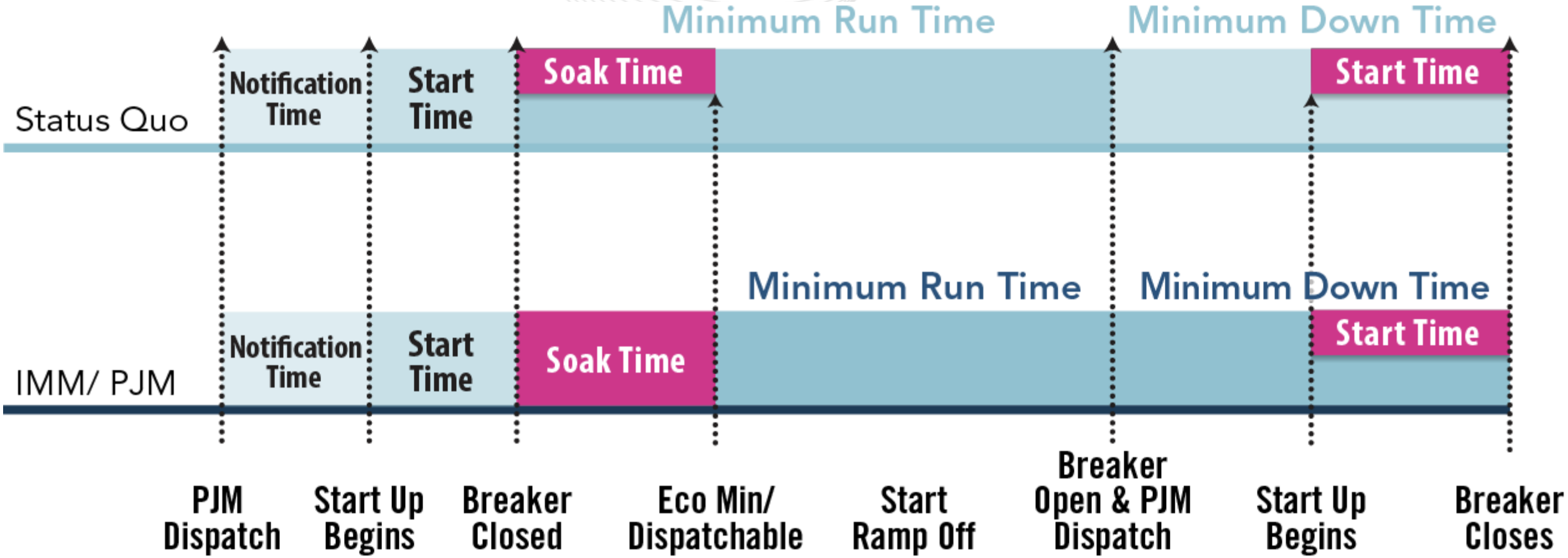
Implementation Details

- Implementation targeted for June 1 2022, in coordination with the 2022/2023 Delivery Year
- Soak Time will be a new Unit Specific Parameter with new proxy values per technology type (i.e. Combined Cycle, Petroleum & Natural Gas Steam, Super-Critical Coal, etc.)
  - Soak Time + New Min Run Time = Current Min Run Time
- A FERC filing will be required before implementation

Un-nested Soak Time Proposal



Soak Time Definition

***Hot/Warm/Cold* Soak Time (hour)** — *The minimum number of hours a unit must run, in real-time operations, from the time after generator breaker closure which is typically indicated by telemetered or aggregated state estimator MWs greater than zero to the time the unit is dispatchable. For Combined Cycle units this is the minimum number of hours from the time just after the first combustion turbine generator breaker closure which is typically indicated by telemetered or aggregated state estimator MWs greater than zero and the time the unit is dispatchable.*
(Un-nested and new PLS Parameter)

Minimum Run Time Definition

Minimum Run Time (hour) — *The minimum number of hours a unit must run, in real-time operations, from the time after generator breaker closure which is typically indicated by telemetered or aggregated state estimator MWs greater than ~~zero~~ the unit is dispatchable to the time of generator breaker opening, as measured by PJM's state estimator. For Combined Cycle units this is the time period after the first combustion turbine generator breaker closure which is typically indicated by telemetered or aggregated state estimator MWs greater than ~~zero and~~ the unit is dispatchable to the time of the last generator breaker opening as measured by PJM's state estimator.*

- Market Sellers will be able to provide Cost-based and Price-Based Hot/Intermediate/Cold Soak Times. For each Soak Time Market Sellers will be able to specify a:
  - daily Soak MWh profile
    - i.e. – 50 MWh, 100 MWh, 150 MWh
  - hourly Soak Cost ($/MWh)
    - i.e. – hour 1 - $24, hour 2 - $25,….hour 24 - $23
- Market Sellers will be able to opt-out of the use of Soak Time

Soak Cost

Soak Cost ($/MWh) – the average hourly hot, intermediate, and cold temperature state costs to operate a the boiler, turbine, and generator during the soak period after breaker closure to dispatchable and is determined based on the sum of the unit's hourly soak heat input, Performance Factor, maintenance adder, operating costs, and emissions adders divided by the sum of the MWhs produced during the soak period.

SoakCost ($/MWh)=

$\sum_{Soak\ hour=1}^{n}$ [[SoakHeatInput (Mbtu/(hr)*TFRC($/MBtu)*PerformanceFactor]

+MainetenanceAdder($/MWh)

+ OperatingCost($/MWh)

+EmissionsCosts($/MWh)] / $\sum_{Soak\ hour=1}^{n}$ Soak MWhs

Soak Heat input – Hourly fuel consumed from breaker closing to unit dispatchable
Maintenance Adder – See Manual 15 ection 2.6
Operating Costs – See Manual 15 Section 2.3.7
Emissions Costs – See Manual 15 Section 2.3.5
Soak MWhs – Hourly MWhs produced during the soak time period

Cost-Based Soak Time

- Cost-Based Soak Time will be:
  - parameter limited
- Cost-Based Soak MWh Profiles are:
  - a daily parameter, not hourly dependent, and not updateable Intraday
  - submitted to PJM and IMM for review and will be developed using actual plant data
- Cost-Based Soak Costs ($/MWh) are:
  - averaged hourly cost during the soak period
  - calculated in accordance with Manual 15
  - hourly differentiated to allow modeling of the gas day
  - updateable in the Intraday

Price-Based Soak Time

- Price-Based Soak Time will not be:
  - parameter limited
- Price-Based Soak MWh Profiles are:
  - a daily parameter, not hourly dependent, and not updateable Intraday
- Price-Based Soak Costs ($/MWh) are:
  - hourly differentiated
  - will follow current rules for price-based Start-up and No-load
    - Can only be changed twice a year during open enrollment (by March 31 & September 30 annually)

Price-Based PLS Soak Time

- Price-Based Soak Time will be:
  - parameter limited
- Price-Based Soak MWh Profiles are:
  - a daily parameter, not hourly dependent and not updateable Intraday
  - Should PJM use Cost-Based Soak MWh Profile?
- Price-Based Soak Costs ($/MWh) are:
  - hourly differentiated
  - Updateable twice a year during the open enrollment windows (by March 31 & September 30 annually)

Soak Time Opt-Out

- Market Sellers will have the ability to Opt-Out of Soak Time in Markets Gateway
  - Soak Time for Opted-Out units will be zero.
  - Market Seller will be able to increase Minimum Run Time on Price-Based schedules to include Soak Time
  - Cost-Based & Price-Based PLS Schedule's Minimum Run Time will be limited to the approved Unit Specific Parameter or proxy value.

- Day Ahead
  - DA MWh hourly awards during Soak Time will reflect the submitted MWh profile

- Real Time
  - Dispatch would use Time to Dispatch in place of Time to Start for start of unit's Minimum Run Time

Soak Time Settlement

- Settlements will use the applicable temperature state average hourly Soak Costs for make whole calculations
  - No-Load will not be used for make whole calculations during soak period
- Soak Time Operating Reserve Credits rules
  - Total soak MWh are expected to be ±10% of the submitted profile
  - Soak MWhs will be compensated at Soak Cost up to 110% of total soak MWh
  - If the total MWh value for the soak time period is greater than 110% of the total soak time profile, the total soak time offer will be capped at the soak time profile MWh
  - If total soak MWh are less than 90% of the total soak profile, Operating reserves will floor the buyback MWh charges for each 5 minute interval at zero.

Soak Time Deviations

- Units that choose the cost-based option for Soak Costs will be considered following dispatch during their submitted Soak Time.
- Units that choose the price-based option for Soak Costs will be considered to be not following dispatch when both:
  - (i) their price-based soak MWh profile is not equal to the cost-based soak MWh profile and
  - (ii) their total Real Time soak MWh are greater than 110% of the submitted total soak MWh or less than 90% of the submitted total soak MWh

  and will be subject to balancing Operating Reserve Deviation charges.
- Deviations will be charged on a five minute interval basis based on Real Time settlement interval MWh minus Day Ahead MWh profile.

Settlement Examples

- The following settlement examples are included in the spreadsheet posted for this meeting:
  - Example with one average soak cost
  - Revised example with one average soak cost over 2 days
  - Delayed Soak example
  - Faster Soak example
  - Example Opt-Out with Price-Based Soak
  - Example Opt-Out with Cost Based Soak