

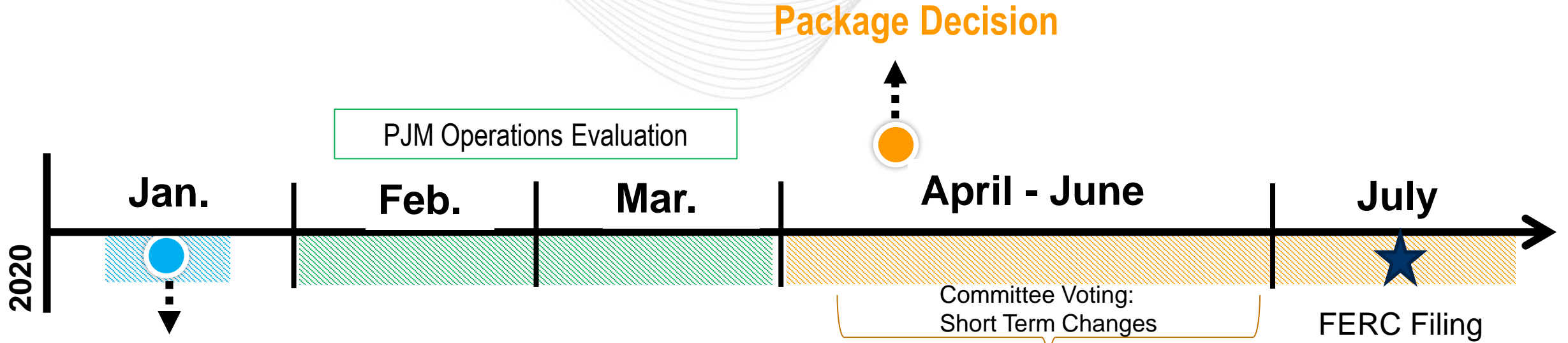


Status Update and PJM Package Highlights: 5 Minute Dispatch and Pricing

Market Implementation Committee
April 15, 2020

- Operational review complete
 - Included sessions with MISO and SPP
 - PJM considering changes that impact operator actions such as SCED frequency, inputs, and approval timing
- PJM Package Details
 - Short Term Changes
 - SCED, LMP enhancements, and additional transparency
 - PJM is committed to these changes
 - PJM's legal view is that the short-term changes achieve FERC directive for Fast Start
 - Intermediate Changes
 - Minimize case approval to one RT SCED case for each 5 minute target time. Dependent on operator training and software changes
 - Long Term Changes
 - PJM cannot commit to these changes until further evaluation is complete to determine operations benefits and impacts
 - PJM needs to prioritize and consider parallel or incremental implementation approach
 - Updates to be provided as appropriate to Stakeholders and Monitoring Analytics

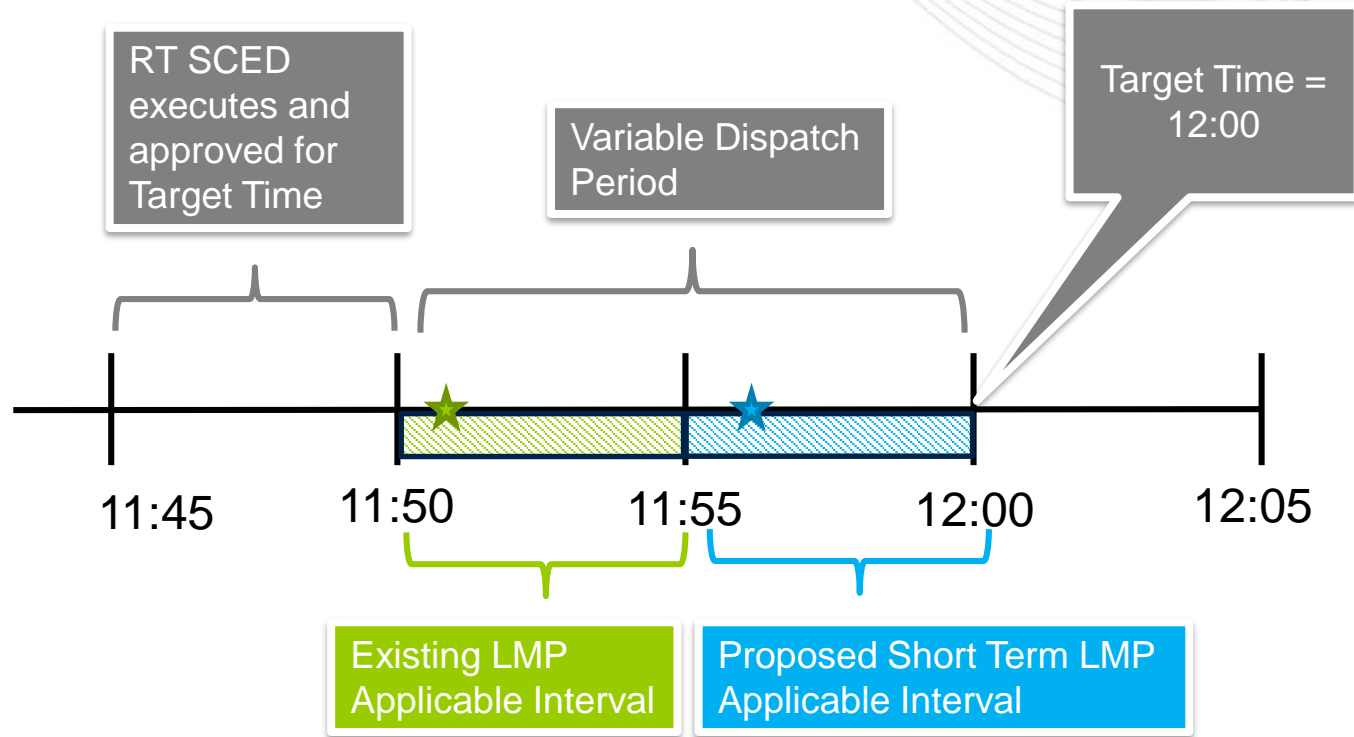
5 minute Dispatch and Pricing Tentative Timeline



Jan. 23rd
FERC Order on
Fast Start

Committee	Action
April MIC	1 st Read
May MIC	Vote
May MRC/MC	1 st Read
June MRC/MC	Vote

- **Align LPC to use the reference RTSCED case for the same target time**
 - Example: LPC calculates prices for interval from 11:55 to 12:00 using RT SCED solution with target time 12:00
 - Execute LPC cases every five minutes after the start of dispatch interval. Therefore, a delay of approx. 5-6 minutes will occur between when the RTSCED case is approved and priced
- **Resource Offers, Parameters and Ancillary Service assignments corresponding to the interval ending at the target dispatch time are used as input to the RTSCED Case**
 - Example: Offers for 11:00 to 12:00 will be effective up to and including the 12:00 target time. Offers 12:00 to 13:00 will be applied to dispatch target time of 12:05
- **LPC will use the most recently approved RTSCED case from previous target time if no approved RTSCED case exists for the same target time (Status Quo)**
- **Transparency and LMP Verification enhancements**
 - To be determined



- ★ Existing LPC case execution time
- ★ Proposed LPC case execution time

SCED Changes:

- Hourly Offer Curves for 11:00 hour used instead of 12:00 hour
- Inflexible Sync Reserve and Regulation awards determined by ASO for 11:00 hour instead of 12:00 hour

LPC Changes:

- Align LPC to use the latest approved RT SCED case for the same target time (**interval ending**)
- LPC case executed at a predefined time, shortly after the start of dispatch interval
 - I.e. the LMP for 12:00 is executed at 11:56:30

- The objective is to approve one RTSCED case for each 5 minute dispatch target time
 - Auto execution of RTSCED cases changed to every 5 minutes
 - Additional cases may be manually executed and approved as needed by dispatch
 - PJM will transition to this state through operator training and software changes



Package Details: Long Term Changes Under Evaluation

- PJM will continue to evaluate the impact and benefits of these long term changes
 - RTSCED cases will auto execute every 5 minutes with a target time of 10 minutes into the future
 - The initial MW for the new case will be adjusted for feasibility using the previous dispatch MW as an input
 - RTSCED Case Approval
 - If a case is not manually approved by dispatch for a target time, a case will be automatically approved at a specified time or deadline prior to the start of the dispatch interval
 - A case may not be approved for target time at dispatcher discretion
 - Typical reasons include data errors or software failures
 - Additional transparency provided when RTSCED cases are not approved for a target time
 - Additional changes to Ancillary Service products may be required to support these long term changes

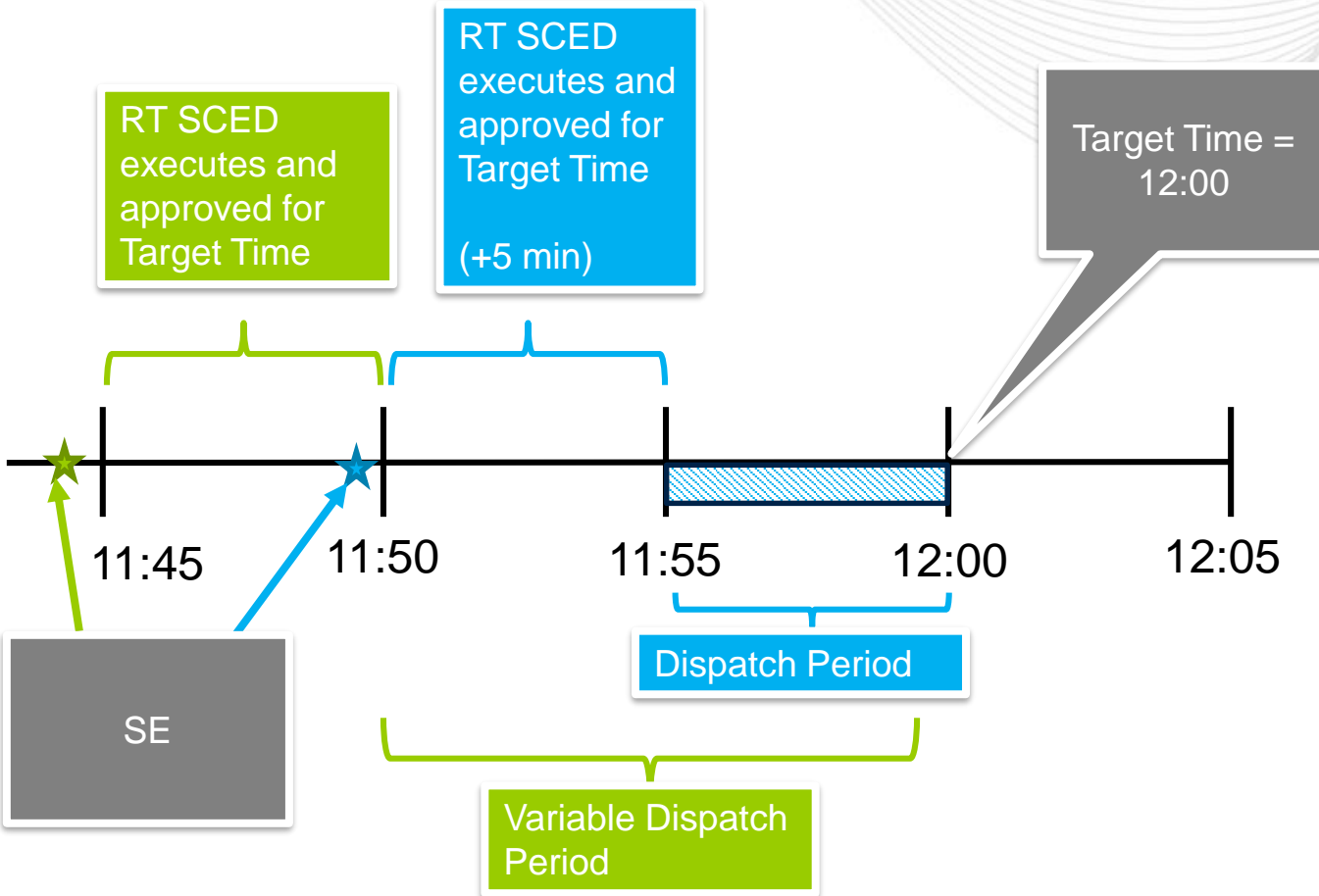
Current SCED vs. Proposed Long Term SCED Implementation

Current SCED Execution

- RTSCED cases auto-execute every 4 minutes, 10 to 14 minutes prior to target time
 - RTSCED cases are manually approved at dispatcher discretion
- The most recent SE MW is used for initial MW

Long Term SCED Execution Under Investigation

- RTSCED cases will auto execute every 5 minutes, 8 to 10 minutes prior to target time or manually executed by dispatch
 - If RTSCED case is not approved for a target dispatch interval, will be automatically approved at a specified time or deadline prior to the start of the dispatch interval
- The initial MW for the 11:55 case will be adjusted for feasibility using the previous dispatch MW, 11:50 approved case, as an input



- Request endorsement of PJM short term changes
 - Split alignment related changes and Transparency related changes into two separate packages
 - Alignment related changes (1A - 1O in Matrix)
 - Transparency (2A - 4C in Matrix)
- PJM will bring forth a proposed timeline and implementation details for the intermediate changes within the next two months
- Continue to evaluate long term changes

Questions?