Automating Bid Duration for Economic Demand Response Participating in Energy Markets

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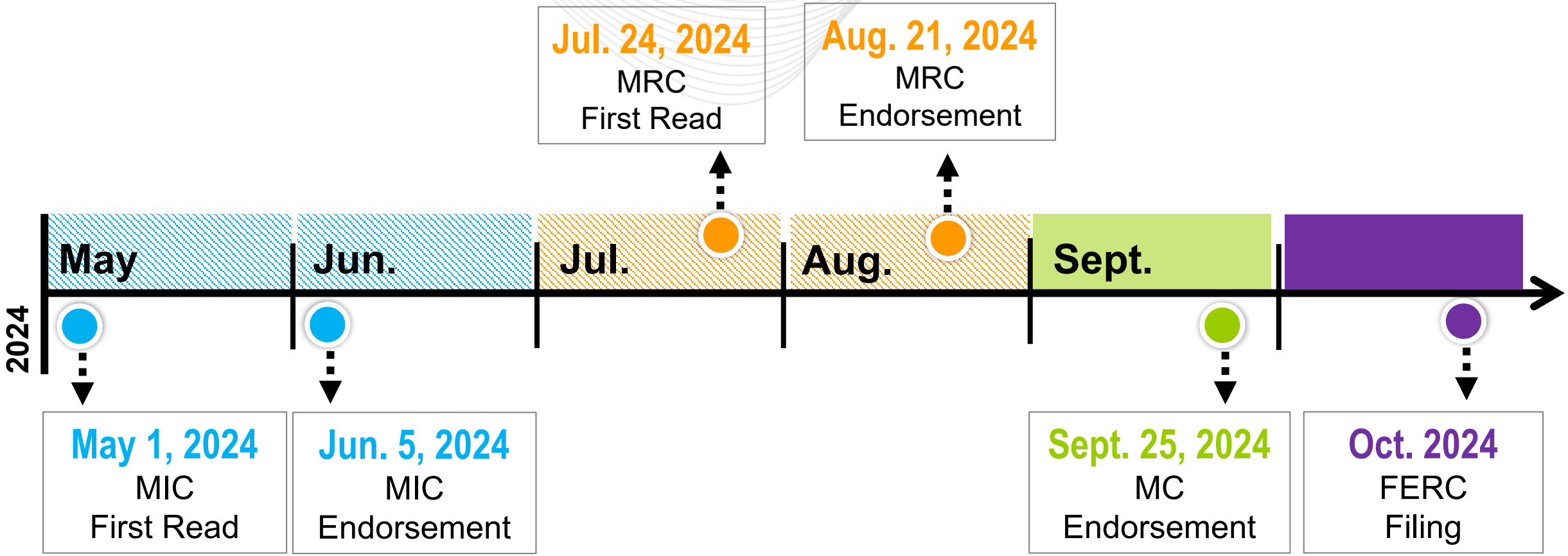
Background

- The Issue Charge was first introduced to DISRS in May 2023
- The Issue Charge was revised and approved by MIC in November 2023
  - Issue Tracking
- DISRS completed Key Work Activities through CBIR Light

Detailed Work Plan -- Economic Demand Response Automate Bid Duration	12.4.2023	1.8.2024	2.5.2024	3.4.2024
Review Updated Issue Charge	X			
Provide Education	X			
Develop & Review Interests	X	X		
Develop & Review Design Components		X	X	
Develop & Refine Solution Options		X	X	X
Develop & Refine Solution Packages			X	X
Build Consensus			X	X

- DISRS reached consensus on one solution package on March 4, 2024

Review/Endorsement Timeline



Issue

- Difficult to align Economic DR load reduction capability with day-ahead energy commitment and/or real-time energy dispatch. Some customers have specific load reduction requirements:
  - Can only reduce load for certain amount of time
  - After DR is released, can only reduce load again after a certain amount of time

Current Demand Response Parameters

- Two timing related operating parameters are currently being used by market clearing engine (MCE) to clear/dispatch an Economic Demand Response (DR) resource in the Energy Market
  - Notification time : amount of time required prior to full implementation of load reduction
  - Minimum down time : amount of time required after DR is dispatched before it can be released
- Daily values can be specified for both parameters for use in the Day-ahead and Real-time Markets. Hourly differentiated values for both parameters can also be specified but are only for use during the Real-time commitment and dispatch.
- DR is cleared/dispatched when projected LMP > bid price, subject to parameter constraints and released otherwise:
  - DR resource can be cleared/dispatched multiple times per day.
  - If DR resource in RT energy market has been curtailed and released during a market day, then "Notification Time" will be enforced for the next curtailment during the same market day.
- "Notification time" and "Minimum down time" from Demand Response are similar to Generator's "Cold/Warm/Hot Notification Time" and "Minimum Run Time" respectively

Proposed 2 new Economic DR Parameters for the energy market

- Maximum Down Time - the maximum number of continuous hours for which a DR bid can be cleared/dispatched in the energy Market.
  - DR resource will be released from energy commitment once its continuous curtailment hours are greater than “Maximum Down Time” even if still economic
  - This parameter is optional and is treated as undefined and not enforced by market clearing engine if not submitted.
- Minimum Released Time - the minimum number of continuous hours that must elapse from a DR resource release and its next curtailment commitment in the energy market.
  - If DR resource in DA energy market has been curtailed and released during a market day, then Minimum Released Time will be enforced for the next curtailment during the same market day.
  - If DR resource in RT energy market has been curtailed and released during a market day, then maximum of “Minimum Released Time ” and “Notification Time” will be enforced for the next curtailment during the same market day.
  - This parameter is optional and will be treated as 0 by clearing engine if not available.
- Daily values can be specified for both parameters for use in the Day-ahead and Real-time Markets. Hourly differentiated values for both parameters can also be specified but are only for use during the Real-time commitment and dispatch.

If members and FERC approve, PJM would like 9 months to implement

Enhancement on DR Parameters

- Examples with these two new parameters “Maximum Down Time ” and “Minimum Released Time ” assuming a DR bids in as available for energy for 24 hours of a market day. “Maximum Down Time” should always be greater or equal to “Minimum down time.”

Example 1 (**Max Down Time**)

Notification Time	2
Min Down time	2
Max Down time	3
Min Release time	5
Strike Price	$100

Start Hour of MCE Study

Hour	1	2	3	4	5	6	7	8	9	10	11	12
LMP	$50	$50	$50	$50	**$120**	**$95**	**$150**	**$150**	**$150**	$50	$50	$50
Curtail/Release	Release	Release	Release	Release	**Curtail**	**Curtail**	**Curtail**	Release	Release	Release	Release	Release

Max Down Time

Enhancement on DR Parameters

Example 2 (**Min Released Time**)

Notification Time	2
Min Down time	2
Max Down time	3
Min Release time	5
Strike Price	$100

			Start Hour of MCE Study														
Hour	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
LMP	$50	$50	$50	$50	**$120**	**$95**	**$150**	**$150**	**$150**	**$95**	**$150**	**$150**	**$150**	**$150**	**$150**	$50
Curtail/Release	Release	Release	Release	Release	**Curtail**	**Curtail**	**Curtail**	Release	Release	Release	Release	Release	**Curtail**	**Curtail**	**Curtail**	Release

Max[Min Released Time, Notification Time]

Example 3 (**Max Down Time** & **Min Released Time**)

Notification Time	2
Min Down time	2
Max Down time	3
Min Release time	5
Strike Price	$100

			Start Hour of MCE Study														
Hour	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
LMP	$50	$50	$50	$50	**$150**	**$150**	**150**	**$150**	**$150**	**$150**	**$150**	**$150**	**$150**	$95	$50	$50
Curtail/Release	Release	Release	Release	Release	**Curtail**	**Curtail**	**Curtail**	Release	Release	Release	Release	Release	**Curtail**	**Curtail**	Release	Release

Min Down Time

Min Down Time

Notification Time

Max Down Time

Max[Min Released Time, Notification Time]

Contact

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