Problem / Opportunity Statement

Automating bid duration for economic demand response participating in energy markets

Problem statement:
Economic demand response (DR) participating in the energy market does not have the ability to automatically limit the duration of a load response energy offer, or to require a "cooldown period" between events. While there is a manual solution for economic DR to limit bid duration, specifically by using the Availability bid parameter,[1] this is not scalable. The ability to automatically place limits on the maximum duration of an event and minimum gap between events would be similar to options provided for generators, which can use the maximum run time[2] and minimum downtime[3] bid parameters, respectively. Economic DR does have the ability to specify minimum downtime, which is the minimum number of contiguous hours for which an Economic DR ~~Load Response~~ offer must be committed/dispatched,[4] but not a maximum. Economic DR also has the ability to specify the notification time, which is the amount of time required prior to the dispatch of DR in the real-time energy market.

As mentioned, economic DR can currently use Availability status to indicate the hours when load response is available to participate in the energy market. However, this can only be updated for any hour not already dispatched in the real-time energy market, meaning that to limit event duration in the real-time market, a Curtailment Service Provider (CSP) would have to manually update Availability once a bid has cleared in enough previous hours, an option that is both unrealistic at scale and error prone.~~dispatched~~. Also, since~~Given that~~ PJM clears all 24 hours of the day-ahead market simultaneously, using hourly Availability to limit dispatch length in the day-ahead market is not possible. ~~Furthermore, to limit event duration in the real-time market, a Curtailment Service Provider (CSP) would have to manually update Availability once a bid clears, an option that is both unrealistic at scale and error prone.~~

Considerations for additional operational parameters will help better align Economic DR capability with day-ahead energy commitment and/or real-time energy dispatch.

~~**Use Cases:**~~
~~Based on Voltus's experience in other ISOs, the ability of demand response to participate as an economic resource in energy markets, particularly the real-time energy market, is most~~

[1] PJM Markets Gateway User Guide, February 1, 2022. Section 21.2 allows load response energy offer to specify the following using the Hourly Updates webpage. Specifically, "Use this web page to submit updated hourly Load Response MW (economic min and max), hourly **availability status**, hourly Minimum Downtime, hourly Notification Time, hourly Shutdown Cost, and to note the Area Name of the applicable Reserve Zone/subzone for that location for any given operating hour."
[2] Maximum run time is defined in the Markets Gateway User Guide in Section 8.7 and states: "**Maximum Runtime (hour)** – The maximum number of hours a unit can run before it needs to be shut down, calculated as difference between the time the unit is put on-line to the time the unit is shut down. In the Day-Ahead Scheduling process, it is calculated at the maximum number of hours a unit is producing > 0 MW output. The default value is infinity."
[3] Section 8.7 of Markets Gateway User Guide, which allows generation resources to specify a "**Minimum Downtime"**

– calculated as the difference between when the unit shuts down and the next time the unit is put online

[4] See section 21.6 of Markets Gateway User Guide which specifies, “Minimum down time, expressed as a number of hours, represents the minimum number of contiguous hours for which a Load Response offer must be committed/dispatched in the energy Market. Minimum down times are optional.”

~~applicable to HVAC load, which is consistently around 65 GW in PJM.[5] With increased automation at facilities, it is likely that Demand Response customers will be able to identify additional processes with lower opportunity costs that can participate as Economic DR in the energy market. However, regardless of the type of load, or the participation model, in general all customers have a limit on the time that processes can be curtailed, so this request is broadly applicable.~~

~~In addition to the immediate applications with existing demand response customers, Voltus also anticipates that there are emerging applications, such as residential aggregations, and also electric vehicles. While PJM has the Energy Storage Resources (ESR) participation model, it is impossible to anticipate all the various use cases for EVs, and it is likely that some customers will choose to participate as economic DR.~~

Implementation in MISO:

Allowing economic demand response to automatically limit duration of a bid would be similar to a solution already implemented in MISO where an Aggregator of Retail Customers[6] is provided with the following bid parameters:[7]

- Minimum & maximum dispatch time
- Maximum dispatch count per day
- Minimum time between dispatched
- Minimum notification time

~~**Voltus Experience:**~~

~~Voltus is the leading software technology platform and virtual power plant operator connecting over 4 GW of distributed energy resources to electricity markets, delivering less expensive, more reliable, and more sustainable electricity. Our commercial and industrial customers and DER partners generate cash by allowing Voltus to maximize the value of their flexible load, distributed generation, energy storage, energy efficiency, and electric vehicle resources in these markets. Voltus operates in all major North American energy markets including ISO-NE, NYISO, PJM, MISO, ERCOT, and CAISO as well as OPA and AESO in Canada.~~

[5] https://www.pjm.com/-/media/committees-groups/subcommittees/las/2022/20221027/item-05---load-forecast-model-development.ashx

[6] MISO uses the term Aggregator of Retail Customers, which has a similar definition to PJM's Curtailment Service Provider

[7] MISO Demand Response Business Practices Manual (BPM-026-r9), Exhibit 4-6: DRR Type II Commitment Operating Parameter Data Summary, page 47