Energy Storage Enhancements – Straw Proposal

Gabe Murtaugh
Storage Sector Manager

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General Session
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The ISO is considering significant enhancements to the existing storage models through this process

- Replacement tool for the minimum state of charge requirement
  - Will provide opportunity cost compensation for batteries instructed to ‘hold’ state of charge in the real-time market

- New considerations for storage with AS awards

- Enhanced exceptional dispatch tools for operators using storage

- Allow storage resources to have variable charging rates
The ISO is considering significant enhancements to the existing storage models through this process:

- Allow for storage to submit multiple bids, for use at different state of charge values
- Introduce a storage model with transition times
- Allow pseudo-tie resources to be co-located
- Compensation for investment tax credit losses while grid charging
- Enhance co-located model to prevent grid charging
The ISO is proposing a new real-time product to replace the minimum state of charge requirement

- Minimum state of charge requirement does not include compensation for resources precluded from discharging
  - ISO has 2 years of tariff authority for use of this tool
- Hourly **state of charge product** will be implemented in the real-time market for storage
- Upon implementation, the current minimum state of charge requirement will be retired
- Bids for product are due 75 minutes prior to the start of the hour
  - RA storage resources will be required to bid the state of charge product
  - Bids will compensate resources for opportunity costs of holding state of charge
The ISO is proposing a new real-time product to replace the minimum state of charge requirement

- Procurement targets will be based on periods when loads exceeds non-storage generation (i.e. hours ISO is critically reliant on storage)
  - Targets will only be enforced on days when these conditions are met
  - ISO anticipates that these requirements will be enforced infrequently initially
- Procurement targets will be set prior to needs when conditions are best for charging
  - Targets will be graduated, to account for time the storage resource fleet takes to charge
- Awards will be made on an hourly basis, and awards will imply requirements on state of charge
The ISO will procure state of charge when non-storage generation cannot meet net-loads.
An example illustrates how this product might work

• The ISO may determine that 3 GWh of energy is needed from storage resources to maintain grid reliability
  – This determination is made by summing the area under the load curve and above the expected non-storage generation curve (shaded)

• The storage fleet can charge at 1,200 MWh per hour
  – Actual charging capability indicates that the fleet will take just under 3 hours to charge to 3 GWh
  – Charging prices may be lowest in hours ending 11, 12 and 13; this is when the ISO will first begin imposing aggregate state of charge targets
  – Requirements are in place until and begin decreasing at HE18

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