Energy Storage Participation in RPM

Options Matrix

					Solution Options[2]							
Number	Design Components[1]	Priority (high/med/low)	Status Quo	ESA	A	B	C	D	E	F	G	H
1	Must offer requirement in day ahead market	low/medium	N/A	As other generation: must offer can be met through DA market, self schedule, or optional hydro optimizer	Self-scheduling	PJM optimization (e.g. pumped hydro)	Standard DA/RT, respecting max run time/max energy limits					
2	Minimum continuous electricity time capability	high	- No current standard - 4 hours (based on fuel limited resources) - regulation is hourly market - cannot be out for XX mins or else forfeit bid - dependent on market software	N/A, 330kWh to provide 100kW of UCAP (Proposed as Minimum Energy Capacityu)	1 hour	keep current products - limited, extended summer consistent with shortest duration of current DR products	10 hours	15 mins/shorter than 1 hour	4 hours			
3	Minimum continuous electricity production capability	low/medium	- Continuous capability for a certain period - 0.1 MW for existing resources	100kW	status quo							
4	Test requirements	medium	- 1-2 hours based on resource type, Steam 2 hrs, Hydro 1 hr - Qualifying test - Seasonal test - Equivilant to duration	Option A to verify power rating. Once per year, full charge/discharge cycle at rated UCAP to verify MWh.	initial test - CIR, annual/seasonal test qualification test similar to regulation							
5	Metering requirements	low/medium	- As outlined in manual 14D - LM outlined in manual 11 - Energy market in load response manual	Option A	Comply with rules in Manual 14D							
6	How does a PJM Resource make itself availible/Method of Availibility to PJM	medium	Enter through queue process, Register as part of Markets Database, make themselves availible trough eMarket- Traditional generators - daily must offer - DR - have to register prior to delivery year - if EO - 20 mins notice, self schedule	Must offer requirement applies to UCAP. Emergency procedures extend to full ICAP.	energy market must offer obligations							
7	Offer parameters	high	mins/max, startup, emergency min/max, price/cost based, cost curve 1) Beginning and End of Day Storage levels in MW. (INITIAL MW, FINAL MW) 2) GenMin and PumpMin values, which will be the minimum hourly pumping and generating MW (MIN PUMP MW, MIN GEN MW) 3) Pumping efficiency (PUMP FACTOR). 4) Maximum or minimum storage level constraints (MAX MW, MIN MW) Other parameters for regular resources as well: Start up/ shutdown costs	Option A	status quo plus max run time and/or max energy and min charge time when using pumped hydro parameters, make obvious substitusions: pump/generate -> charge/discharge pumping efficiency -> cycle efficiency etc.							
8	Response and recovery	medium/high		Option A	Notification time for RT energy may vary with charge state.Scheduling method in (1) must respect recharge times.							
9	Capacity Value: How to determine UCAP	high	- Discount ICAP based on outage rates, e.g., most gen - UCAP is fraction of ICAP, e.g., intermittent resources - Administratively determined, e.g., Energy Efficiency - Inferior product with limited clearing and price separation, e.g., sub-Annual DR.	UCAP is the lesser of energy capacity divided by 3.3 or maximum output power. eFORd applied as for other generation. Treated as generation in RPM auctions	Calculation based on load carying capabilty at constant LOLE	ICAP derated by forced outages	actual output over series of peak hours (eg. Wind model)	average hourly output over req cont operation hourly req				
10	Applicability: what types of resources rules apply to	medium/high	- PS - submit day ahead, schedule, blackstart level, never fully depleted - battery would never deplete due to degradation compared to PS	Option A	All interconnected storage devices not covered by current rules							
11	Scheduling method	low/medium		Option A	As specified in (1)							
12	Cost Based Offer Cap	high		Energy offer cap accounts for cost of purchased energy and cycle losses (e..g, net energy consumption)								
13	Emergency Procedures Obligations	medium		Option A	During Min/MaxGen: 1. PJM may dispatch unit to charge/discharge at highest capable level, regardless of capacity obligation. 2. Unit not to discharge/charge except at PJM direction (following regulation signal counts as at PJM direction)							
14	Performance Assessment	high	- Seasonal verification test - EFORd and EFORp performance - DR compliance check - MMV for energy efficiency	Option A	EFOR(x) counting only hours when scheduled for energy. Outages forgiven in hours following emergency energy dispatch.							
15	Settlements/Penalties	high		Option A	As other generators, plus: 1. opportunity costs for transistions and "hold charge" hours included. 2. opportunity costs may be incured during PJM directed charging as well as discharge. 3. make-whole payments if uneconomically dispatched by PJM (i.e., LMP while charging > efficiency * LMP while discharging)							
16	Immature resources/transition mechanisms for determining capacity value	medium/high		Class average EFORd determined by review of storage currently in service; may be technology dependant.								

Directions:

[1]Design Components - each is an "attribute" or "component" of any proposed solution. Consensus of the group should be sought on selection of a set of solution criteria.

[2]Solution Options - each is a solution alternative elicited from the stakeholder group that meet one of the specific solution criteria.

To complete the matrix:

1. Elicit from the stakeholder group a set of components (attributes) desired for any proposed solution. Enter a short label for each in the Design Components column.
2. If needed, enter a more detailed description of each criteria on the "Component Details" tab.
3. Using informal/non-binding voting, rate each component's priority in the final solution as "high/medium/low"
4. Elicit from the stakeholder group potential solution alternative(s) for each component. Enter a short label for each in the Solution Options columns.
5. If needed, enter a more detailed description of each potential solution option on the "Solution Details" tab.
6. Once the matrix is filled out, the group will attempt to select a single solution alternative (column) for each component (row) to form a solution "package".
   Example: cells 1B, 2C, 3A, 4B, 5D could make up a solution package.
7. If consensus is achieved on a single package (Tier 1 decision-making method), this will be documented in a Consensus Proposal Report to the parent committee.
8. If not, the group will identify up to 3 possible solution packages in a comparative Proposal Alternatives Report to the parent committee (Tier 2 decision-making method).