

Draft bullets for NHA panelist @ FERC E and AS conference:

- Hydro is missing link in clean energy transition, it provides energy storage, ancillary service and other reliability services (e.g., inertia, voltage control, IROL increase to transfer capability, etc.), integrates other renewables, and does so on a non-emitting basis.
 - Yet, it is either excluded from state policies or relegated to lesser renewable compensation under state programs so it must rely heavily on E and AS revenues (and capacity revenues) for its reinvestment to continue (1/3 fleet up for relicensing by 2030)
 - Hydro loses out on 1 billion annually on state support that it would receive if it were treated on par with wind and solar (source 2018 brattle report for NHA)
- **HIGH LEVEL POINT:** The intense focus in wholesale market discussions on how to get *new* resources in has muted the discussion on how we send the signals necessary to retain these *existing* resources we will continue to need into the future
- Brattle report noted how valuable flexible hydro is and ways to more accurately value flexibility (new products like ramping, scarcity pricing in reserves, and compensating inertia)
- While the instant tech conference is focused more specifically on E and AS, they are inextricably interconnected with the capacity market. Specifically, where an RTO employs a capacity market, the capacity sale obligations essentially obtain a call on energy, and depending on the resource's design, ancillary services as well.
 - Consequently, any good discussion of energy and operating reserves must “start” with the capacity market – that is where the energy and some ancillary service calls are procured by the RTO and sold by resources. Unfortunately, capacity markets currently do not distinguish the value of those energy and ancillary service calls at the point of sale. We struggle to better value them in the E & AS space, yet it is difficult to capture the full value of energy and ancillary service value in spot markets AFTER the sale of the associated (and largely, uncompensated) energy call option.
- Where capacity markets do not exist, mitigation in energy markets, or the absence of supply bidding in AS markets can frustrate good energy and ancillary service pricing.
- That being said, opportunity for improvements in E and AS, including addition of further product markets, may incrementally improve signals to retain the resources we need for reliability (especially if the capacity markets don't distinguish between “performing and non-performing” and “emitting and non-emitting”)
 - More revenue in E and AS would reduce the extent to which resources needed by the system must rely on capacity markets but are unlikely to fully replace capacity revenues;
- If you don't value performance (i.e. flexibility and grid services) in capacity markets; then the only signal for those values is in E and AS;
 - Challenges: declining energy margins, weak AS prices, downward trajectory for capacity prices;
 - Existing resources need sufficient revenue to remain in market;
 - If we don't send adequate signals we risk retiring carbon free flexibility
- **Anecdote:** Most hydro and PSH can go to full output in less than 10minutes (sometimes faster); grid operators rely on this flexibility but don't necessarily reward it
 - Example: lack of day ahead reserves in ISO-NE
 - PSH units in ISO-NE provide critical day-ahead reserve value that is unrecognized – gap in compensation –. Generators in NE have been seeking a day ahead reserve market since 2006.

- While some capacity markets and most energy markets include some form of scarcity, scarcity events are rare as a surplus of resources that can be scheduled on long lead times, much less flexible than hydro, can be used to prevent such occurrences....and that is an objective of RTO operators. Yet, the absence of scarcity or surplus in resource adequacy does not translate into a surplus of the working capacity, like hydro, that RTO operators rely on day to day. It simply means that scarcity revenues will not be the source of revenue to keep the work horses on the system healthy.
 - Some refinements can improve the situation – Valuing reserves before scarcity is reached such as creating a curve for the AS products like ORDC (a non-zero price of reserves above the minimum reserve requirement). Valuing reserves that are critical to achieving the day ahead energy market economics reliably.
 - But nothing can replace valuing the obligations that create the economic energy and operating reserve calls obtained at the point of initial sale – the capacity market.
 - Current revenue is not sufficient –if you don't allow reserves to be priced outside of deficiencies because every operators goal is to never be deficient and have all your contingencies covered. Operators take actions to avoid scarcity situations.