Resource Adequacy Revised Straw Proposal

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Comments of the National Hydropower Association

The National Hydropower Association (NHA) appreciates this opportunity to comment on the California ISO (CAISO) Resource Adeqacy (RA) Enhancements Revised Straw Proposal issued July 1, 2019. The CAISO is evaluating enhancements to its RA provisions to "ensure the effective procurement of capacity to reliably operate the grid all hours of the year."[1] According to the CAISO, a reexamination of its existing RA program is needed, in part, because of "the rapid transformation to a cleaner, yet more variable and energy limited resource fleet..."[2] The NHA recognizes the challenges and opportunities associated with a low-emission electric grid. We encourage the CAISO to design its RA program to incentivize full participation of both internal and external hydropower resources. Hydropower's flexible capacity characteristics, along with its other grid services, will be a crucial factor in meeting California's deep decarbonization goals.

NHA represents more than 240 companies, from Fortune 500 corporations to family-owned small businesses. Our diverse membership includes public and investor-owned utilities, independent power producers, developers, equipment manufacturers and other service providers. As a national association, we have members across the country, including California and its neighboring states in the Southwest and Pacific Northwest. The treatment of hydropower in this proposal will affect our members.

California has committed its electric sector to ambitious, deep decarbonization goals. Meanwhile, electric sector carbon reduction policies were recently enacted in Colorado, Nevada, New Mexico and Washington, and nearly passed in Oregon. As western states increase their reliance on variable energy resources, hydropower has a more important role than ever. In any market, the treatment of hydropower will be profoundly important to assure a least-cost approach to reliably meeting load while achieving carbon emission reduction goals. To ensure hydropower resources stay online and attract adequate reinvestment, market rules should send appropriate price signals to resources that provide products and services needed by the new grid. Bilateral or organized markets should be designed to value energy, capacity, and ancillary services.

Hydropower's Unique Characteristics

Hydropower is unique among generating resources because it is carbon free and can provide nearly all the attributes necessary for a reliable and resilient electric grid from dependable capacity to black start capability. Its ability to ramp up or down quickly in response to consumer demand or to offset variable energy resource production is valuable in a rapidly evolving electric system. As the

[1] California ISO Resource Adequacy Enhancements Revised Straw Proposal. July 1, 2019. Page 4.
[2] Ibid. Page 4.

grid integrates more and more variable energy resources such as wind and solar, hydropower's ability to provide firm capacity, frequency response, voltage support, load following and long-term storage is increasingly critical. While each plant is different and some have greater capabilities than others, hydropower projects have the characteristics defined as necessary to most affordably help meet CAISO's needs. These are also high-value services:

- **Firm/Installed Capacity:** Hydropower systems are built to take advantage of high stream flows and hence have available capacity that can be called upon to meet system peaks.

- **Annual Energy:** Even though stream flows can vary, hydropower is a reliable resource that produces energy throughout the year. Hydropower generation can be forecasted with a high degree of accuracy. Reservoir storage at individual dams, and systemwide, can facilitate the best coordinated use of water.

- **Regulation and Frequency Response:** Hydropower projects can provide frequency regulation by responding within 4 seconds to meet reliability merely by allowing more water to pass through turbines using automatic generation control — or simply by relying on large machine inertia. Fast load ramping rates provide rapid frequency response without generating carbon emissions. The control systems used on hydropower units (governor controls) provide the arresting frequency response, as well as the initial recovery response to major system events, to protect consumer equipment and provide electric grid reliability.

- **Spinning Reserves:** Because hydropower projects generally have some turbines that are not being fully utilized, hydropower is a natural fit for supplying reserves that can respond to load changes in as fast as 10 seconds.

- **Non-Spinning Reserves:** Hydropower units are able to quickly turn on and provide power in less than 10 minutes, and can maintain output for an extended period using less than fully utilized turbines. Since hydropower is capable of responding in less than 10 minutes, some markets have begun to differentiate a fast ramp product, which can realize hydropower's value.

- **Flexible Capacity:** Many hydropower projects are flexible enough to adjust generation during the day to assure loads and resources stay in balance. This flexibility is critical in integrating wind and solar, especially during steep ramping events, such as those experienced in California and other regions.

- **Long-Term Storage:** Conventional hydropower projects with reservoirs can provide storage capability, providing opportunities to better balance loads and generating resources. Some storage projects have large reservoirs that can store water for months at a time to release when needed. In addition, run-of-river projects can often be coordinated with storage projects to optimize generation from stored water. In addition, pumped storage hydropower provides significant energy storage capacity, capable of daily or even intraday refill, representing 95 percent of the energy storage in the U.S. today. It is the proven, cost-effective, durable, and reliable utility-scale energy storage innovation available.

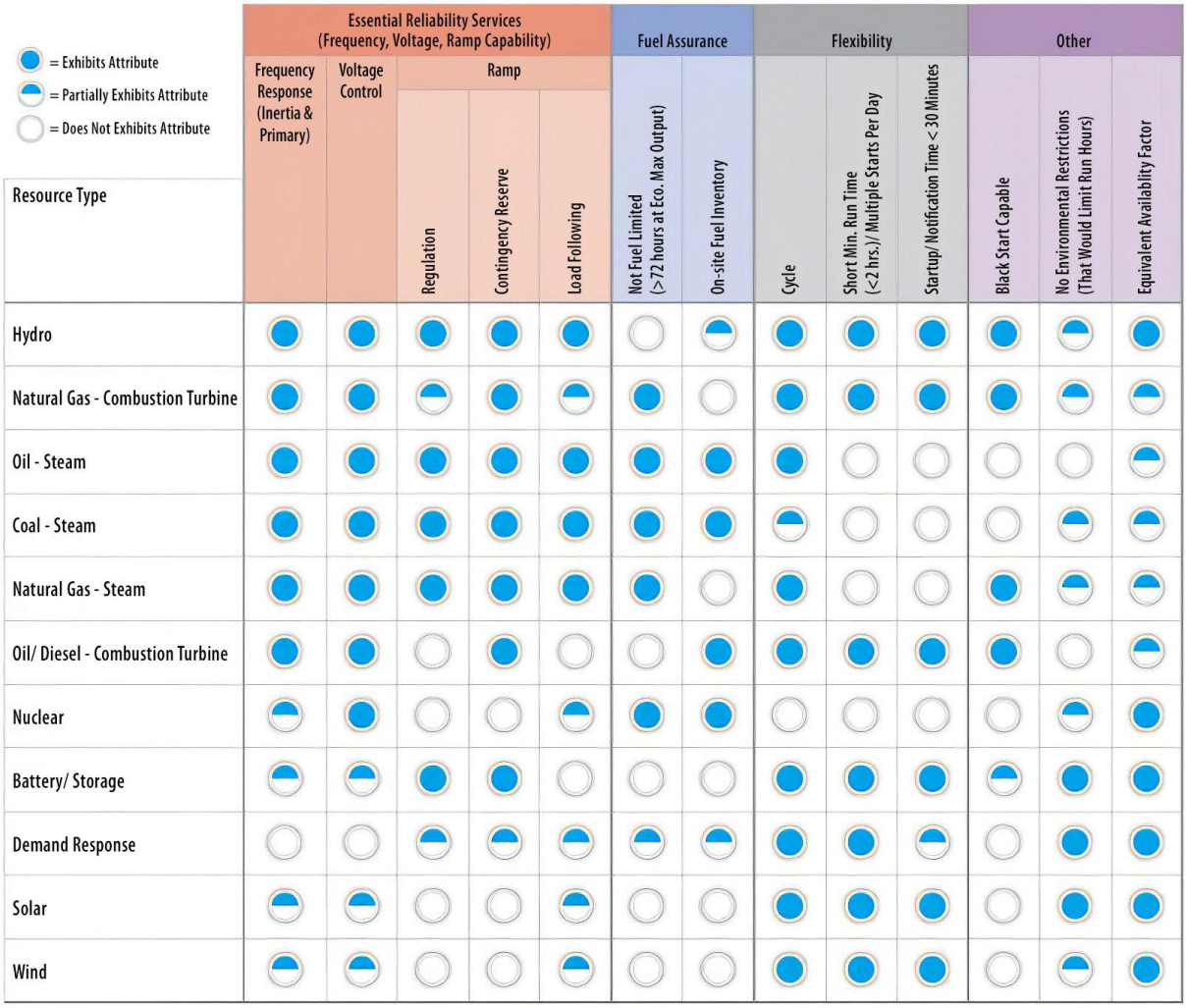
- **Inertia:** Hydropower units are a source of inertia that help avoid widespread blackouts by providing large rotating mass. Inertia can stabilize the grid by slowing frequency declines or increases and damping the oscillations that can occur when there is a sudden change of large generation or load.

- **Black Start:** During outages, hydropower can help restart the power system without support from the transmission grid, enabling other generators to come online. Units can be operational very quickly (within minutes); their output can be continuously adjusted without impact; and they can provide stable system restoration. Grid operators turn to hydropower for black start because it is a proven resource – one that has been undervalued and yet played this critical role time and again, most recently during the East Coast blackout of 2003. The U.S.-Canada Power System Outage Taskforce that examined the East Coast blackout noted specifically that hydropower plants in western New York formed the basis for restoration of power throughout New York and Ontario.

Across the country, hydropower's attributes are increasingly being recognized by grid operators as essential to the safe and reliable functioning of the grid system. In PJM's 2017 Evolving Resource Mix and System Reliability report[3], hydropower was rated as the resource that provides the most grid reliability and resiliency services. The report identified 13 generator reliability attributes. These included: 1) essential reliability services (frequency, voltage and ramp capability); 2) fuel assurance; 3) flexibility; and 4) other attributes (blackstart, no environmental restrictions, equivalent availability factor). PJM found hydropower to provide some or all of the needed attributes in 12 of the 13 categories (again, including blackstart) – the best result of all the resources analyzed. The chart is excerpted below.

[3] PJM's Evolving Resource Mix and System Reliability. March 30, 2017. https://www.pjm.com/~/media/library/reports-notices/special-reports/20170330-pjms-evolving-resource-mix-and-system-reliability.ashx

Figure 6. Generator Reliability Attribute Matrix



Hydropower, therefore, is a multi-purpose performer well-suited to the changing electric grid and societal preferences for a lower-carbon future. The question is how hydropower will be deployed in the future, and whether market design will grow its participation in the CAISO.

General Comments on Valuing Hydropower in the RA Program

CAISO's goal should be to ensure its Resource Adequacy program requirements result in sufficient capacity procured on a forward basis to cover expected system needs. Regarding imports, CAISO can take steps to improve the integrity of its current RA import provisions while simultaneously encouraging participation by external capacity resources. NHA supports import RA requirements that weed out speculative supply by ensuring that import RA contracts are backed by actual physical resources. By making such changes, the CAISO would increase transparency for

load-serving entities while incentivizing participation by resources with truly firm, available capacity.

In general, NHA supports the concept of allowing external resources to provide flexible RA capacity into the CAISO. Hydropower is uniquely suited to provide carbon-free flexible grid services, and such revisions should help address CAISO's growing need for flexibility during the evening ramp.

NHA is also aware that current forward planning methodologies in California may be reducing the participation of out-of-state hydropower resources in the CAISO. For example, there are significant synergies between Northwest and California energy needs, but California may be stranding long-term Northwest capacity contracts because of its market framework. While California entities usually contract capacity for a month ahead, Northwest market participants typically have other, more attractive, opportunities to sell capacity in 6-month or yearly blocks. To the extent that California market design encourages longer-term forward contracting for capacity, more hydropower may be committed to the CAISO.

Collectively, CAISO's forward and short-term market frameworks should send efficient price signals for the types of resources necessary to meet system requirements. For example, reliance on out-of-market dispatch and operator interventions can suppress market clearing prices while failing to look at total costs. In practice, this approach may not be selecting the least cost resources while discouraging voluntary participation by resources when they are needed most. The real goal should be to make sure that the market selects, as a whole, the least cost resources to meet energy and capacity needs while simultaneously ensuring resources are adequately compensated for their contribution.

Conclusion

NHA supports CAISO's efforts to strengthen its RA program in this proceeding. Improvements that reduce reliance on speculative supply, reduce barriers to external resource participation, and minimize out-of-market dispatch will open the door to greater hydropower participation in the CAISO. As California moves toward deep decarbonization, hydropower is well-positioned to support a reliable, lower-cost transition to the future. Fair and reasonable compensation will ensure that appropriate reinvestment in existing and new hydropower assets occurs on a timely basis.