**UNITED STATES OF AMERICA**
**BEFORE THE**
**FEDERAL ENERGY REGULATORY COMMISSION**

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| Post-Technical Conference Comments<br>Hybrid Resources | )<br>) | Docket No. AD20-9-000 |

**Comments of the R Street Institute**

## I. Issue Summary

On July 23, 2020, the staff of the Federal Energy Regulatory Commission (Commission or FERC) convened a technical conference to discuss hybrid resources.[1] In this context, hybrid resources are considered the pairing of an electric storage resource with a generation resource, most commonly a wind or solar powered renewable energy generation resource. On August 10, 2020, the Commission issued a notice inviting post-workshop comments and invited responses to a series of specific questions.[2]

These comments provide the current view of the R Street Institute, including a strategic take on next steps for the Commission. They also provide responses to some of the specific questions posed by the Commission.

## II. Summary of R Street Position

The R Street Institute found the July 23 technical conference on hybrid resources to provide valuable information and insight as the industry determines how best to incorporate this new type of generation resource into the various organized wholesale market structures. We appreciate the opportunity to contribute these post-conference comments, and do so with the intent to contribute to the Commission's and the industry's efforts to reach a common understanding regarding hybrid resources.

With falling prices and specific investment incentives, there is an increase in the amount of energy storage facilities seeking to interconnect in all regions of the country. Many are seeking to be interconnected and operated in a manner as to optimize combined benefits with associated renewable resources. R Street recognizes the efforts of all the ISOs represented at the technical conference to adjust and adapt in the face of changing generation technologies.

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[1] An agenda, description, notices and initial testimonies are located here: Federal Energy Regulatory Commission, *Workshop November 5-6, 2019*. https://www.ferc.gov/news-events/events/technical-conference-regarding-hybrid-resources-docket-no-ad20-9-000-07232020. See Docket No. AD19-19-000 for further information.

[2] Federal Energy Regulatory Commission, *Notice Inviting Post-Workshop Comments*¸ Docket No. AD20-9-000, Aug. 10, 2020. https://www.ferc.gov/sites/default/files/2020-08/AD20-9-000-Post-Tech-Conf.pdf.

Even though there remain significant parochial, ISO-specific processes and procedures, we are hopeful that the focused discussion and these comments will contribute to the determination of ‘best practices’ across the country.

R Street suggests the three areas which require additional work and leadership from the Commission are: 1) identifying limitations within specific ISO market and operating systems and processes which hinder the consideration of a hybrid unit as a single resource; 2) capacity determination/accreditation for storage and hybrid units; and 3) the integration of distributed resources, including renewable and storage, into wholesale electricity markets.

Competitive markets for generation should enable many different types of ownership and operating relationships. Hybrid units, with renewable and energy storage resources operating in a coordinated manner, should be supported and not arbitrarily limited in the manner in which they participate in wholesale energy markets. Just as combined-cycle gas generators have evolved from something new and different when they first emerged as a generation alternative 20 years ago, to their commonplace usage today; hybrid resources are likely to evolve from the ‘latest new thing’ to becoming a significant portion of the generation supply.

All FERC jurisdictional wholesale markets include some type of construct which requires the individual capacity value of renewable and storage generation resources to be determined. Procedures for determining the capacity value of variable energy renewable resources exist in every region. The challenge of determining the capacity value of storage facilities is not to be underestimated. In addition to the complication of properly assessing the capacity value of variable energy resources, when storage resources are operated in conjunction with wind or solar generators, the combined capacity value may be higher. Indeed, if a combined resource does provide greater value, this should incent the resource owner/operator to operate as a hybrid resource. As long as the ISO capacity accreditation process appropriately reflects the value to the system, this is an expected and desired outcome.

The most complicated aspect is likely the determination of how to best handle hybrid resources when they are distributed. In this context we use distributed to mean resources interconnected at voltages below the bulk system and in multiple locations. Making the leap from providing value only to a customer, to being able to aggregate capabilities and achieve value at the wholesale level is a game changer for the future of hybrid resources and therefore the future of electricity service. The work of the Commission so far, culminating in Order 841, goes a long way to establishing requirements for how wholesale markets are to treat energy storage resources.

By issuing Order 2222 on September 17, the Commission has taken the next, very large step. The Commission and the wholesale markets under their jurisdiction are now faced with the challenge of addressing hybrid issues both at the bulk-power (utility) scale and in a distributed manner. We suggest that the Commission act quickly to address any utility-scale hybrid issues identified in this docket, setting aside issues related to distributed hybrids until later, possibly during a subsequent round of Order 2222 compliance review. The alternative of trying to address both types of issues at the same time seems unnecessarily challenging. Arguably, FERC has decided that hybrids are permitted as a distributed energy resource aggregator under 2222 in calling for "heterogenous aggregations" in the tariff reform directive.

## III. Responses to Commission Questions

In regards to the term "hybrid resource", it is important to use common terminology so that when different people use the same term, they mean the same thing, and do not use that term to mean something else. Responses to the Commission's first question should go a long way toward helping industry stakeholders reach this common understanding. Whether hybrid or co-located, the issues of most interest are those that arise when there is a symbiotic relationship between two different types of generation technology.

We suggest that it will be helpful to differentiate between "co-located" and "hybrid" resources by the number of interconnection points. Every organized wholesale market has to specify the location on the bulk power system where each generator is located. Generally, this interconnection location also serves as the point, or node, where dispatch instructions are sent and resulting payments are based. If there is only one interconnection point through which different types of generation technology are able to inject, that amalgamation could be called a 'hybrid' resource. Without a more detailed definition, combined cycle units, comprised of combustion turbine generators and steam generators might be considered 'hybrid'. We suggest that 'hybrid' be reserved for combinations that include a storage component as staff has suggested for the purpose of the technical conference. "Co-located" resources might be best used to describe resources at two different interconnection points, or nodal locations.

The present investment tax credit mechanism produces a limitation requiring renewable energy be used to charge certain storage facilities. There may also be certain situations where there is an ability to connect the various direct-current based technologies together, and using a common inverter(s) is an economically attractive option. Responses to questions two to four should illuminate the size, scale and future expectations for hybrid and co-located resources. It may be tempting to only address those challenges currently right in front of us, but understanding the full scope of what may be required allows the regions and ISOs to develop a road map for updating their market and operating systems. For example, start with ensuring the effective integration of transmission-connected hybrid resources, with an eye toward enabling a future where aggregations are of smaller scale, and distribution-connected hybrid systems can effectively participate in wholesale markets.

Operations of any type of energy storage device are focused on managing its 'state of charge'. Ideally, storage is charged (filled up) when costs are low and discharged (producing) when prices are high. Optimizing these actions is a simple problem if all prices are known ahead of time. However, in the real world, real-time prices by their very definition vary in response to real-time conditions. The responsibility for managing state of charge can rest with the resource operator or the ISO. A resource operator may be basing their decisions on less perfect information than what the ISO has access to. However, if they are 'wrong' they bear the cost. If an ISO is managing the state of charge, their information may be better, but it will not be perfect, and the costs of 'wrong' decisions will be shared by the entire region. Responses to questions four and five should shine some light on the developers' perspective on this trade-off.

Question nine addresses the situation where an existing hybrid resource wants to no longer rely on the renewable resource for storage-charging and start drawing charging energy from the grid. We suggest that from a grid reliability perspective, this situation is no different than a new customer choosing to interconnect at that location, and the burdens, studies and costs should be no greater for the storage resource than they would be for a new factory.

Hybrid resources are just the latest in the evolution of generation technologies, and should be able to provide energy, reserve and capacity services for which they are qualified, in the manner that is the most profitable for the resource. We anticipate that responses to questions 10 and 11 will provide details about the specific limitations that ISOs have identified in their market and operating systems, and lay out their plans for addressing them. Resource owners should be afforded the flexibility to operate their hybrid resource in whatever manner that is most profitable for them, while meeting all reliability and market requirements. Presupposing the best or only allowed manner of configuration will surely lead to market barriers and inefficiencies. As Rob Gramlich cautioned during Panel Four of the conference "we need to be careful (…) not to confuse valid economic choices with real reliability issues."

Question 15 addresses the requirements for hybrid resources to provide data or forecasts of their variable energy resource (wind and solar) components. For example, if a region requires turbine level data from every wind farm, we suggest that a wind/storage hybrid unit would be subject to the same requirement. What the ISO actually does with the provided data, or the generation production forecast that may result, may have to be modified to differentiate a wind or solar resource putting all production to the grid from a wind or solar resource that may be using some of the output to charge an energy storage device.

Responses to question 16 may uncover some of the thorniest issues. Current system dispatch systems rely on linear representations of all inputs and constraints to be able to produce results in a timely (less than five-minute) manner. Although we do not have a specific example to offer, it is feasible that the characteristics of a hybrid unit might be non-linear. This situation may require the hybrid unit to be 'broken apart' and operated separately. However, unless and until a real-world example is brought forth, this problem may not be worth worrying about.

Market power mitigation rules, as addressed in question 18, are important to address up front. Typical mitigation limits resource offers to their 'cost'. Costs for a storage unit include the cost of energy (including losses) necessary to charge the facility. But these direct costs are not the entire picture. When setting mitigation levels, it is appropriate to include opportunity costs. Opportunity costs for any limited energy unit are non-trivial and arise from the fact that if the energy is discharged now, it will not be available later. Generating (discharging) from storage at any time other than the highest-priced period results in a lost opportunity cost. In addition to being a large portion of the costs of storage, opportunity costs are constantly changing, and therefore mitigation levels should also be dynamic.

One idea for addressing this complicated problem is to establish a well-defined "sandbox" in which storage facilities would operate with minimal or no mitigation initially. The idea is to create an environment for these facilities to be free to explore the most profitable behavior and, in a well- designed real-time energy market, the most valuable pattern of operations. The boundaries of such a sandbox could be established as an amount of time and/or a maximum amount of capacity. For such an experiment to work, the storage facilities would have to accept that the rules governing their operation could very likely become more limiting.

Questions 21 through 24 all relate to determining the capacity value of hybrid resources. All FERC jurisdictional wholesale markets include some type of construct which requires the individual capacity value of renewable and storage generation resources to be determined. Procedures for determining the capacity value of variable energy renewable resources exist in every region. The challenge of determining the capacity value of storage facilities is not to be underestimated. Dr. Ela's comment during the Panel Four Q&A, "there's always this trade-off between accuracy and complexity" is something to always keep in mind. The practice of ISO-NE to base capacity accreditation on expected resource output during times of expected system stress is straightforward, easy to understand and can accommodate either hybrid or co-located configurations. Using ELCC requires more detailed calculation, relying on more data and assumptions. If every market were to apply the same ELCC approach, because of differences in local renewable resource characteristics and existing generation fleets, resulting capacity valuations would likely be different.

Unfortunately, both approaches toward capacity accreditation are based on the belief that the risks of capacity shortfall—which are intended to be mitigated through the capacity construct in each market—will continue to be the same in the future as they are today. This is misguided thinking and will lead to spending money on what is thought to be needed and not addressing the changing risks. Near-zero variable-priced renewable energy is economically consumed whenever it is produced. Its pattern of production is generally not aligned with the customer's demand for electricity. This mis-match results in net load (customer demand minus renewable generation) patterns which can vary greatly from traditional load patterns; patterns that utilities have operated with for decades and around which wholesale electricity markets were designed. For markets in the early phases of renewable generation penetration, the differences are small. But for markets with large penetrations the differences can be significant. Capacity accreditation procedures should be adaptive, ensuring that ISOs are actually procuring the proper product, in proper amounts to address the actual capacity supply risks they are facing.

We offer one last thought on capacity accreditation. Although the process should be adaptive to reflect the changing capacity risks, care should be taken to not introduce such changes that would cause sudden large variations in the capacity value of a resource. Unpredictable adjustments create artificial investment risk, which causes investors to discount cash flows, unnecessarily discouraging new investment. For example, if a resource has been determined to be a 100 MW resource and it has received a three-year forward capacity award for the full capacity, good market design would not allow a revised process to suddenly redetermine its capacity value to be 70 MW in year two. One way to manage changes in accreditation would be to hold the capacity value constant for some period of time. Another method would be to limit the changes in capacity valuation to a certain amount to be applied over a period of time. For example, limit changes to capacity valuation to 10 percent at a time.

## IV. Conclusion

R Street Institute respectfully requests the Commission consider the comments contained herein.

Respectfully submitted,

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