Power Advisory LLC

Katherine Sparkes
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May 12, 2021

Dear Katherine,

This submission responds to the Independent Electricity System Operator (IESO) April 21, 2021 presentation, *Hybrid Integration Project,*[1] that launched a new IESO stakeholder engagement initiative.

The scope of this initiative is to produce vision and design documents to define how hybrid storage-generation resources ("hybrid projects") will be integrated within the IESO Administered-Markets (IAM). The Hybrid Integration Project (HIP) is part of the broader IESO Enabling Resources initiative[2] that is also undergoing stakeholder engagement. Since the Enabling Resources initiative is planned to be implemented post Market Renewal Program (MRP) implementation[3], the HIP is also being planned to be implemented post MRP implementation.

Power Advisory has coordinated this submission on behalf of a consortium of renewable generators, energy storage providers, and the Canadian Renewable Energy Association (the "Consortium"[4]).

The Consortium supports the HIP initiative. Over the last few years, the Consortium has championed facilitating development and integration of hybrid projects within IAM. We have made this point within multiple submissions across many IESO stakeholder engagement initiatives, such as the Resource Adequacy initiative[5], the previous Expanding Participation in Operating Reserve and Energy (EPOR-E)

[1] See https://www.ieso.ca/en/Sector-Participants/Engagement-Initiatives/Engagements/Hybrid-Integration-Project

[2] See https://www.ieso.ca/en/Sector-Participants/Engagement-Initiatives/Engagements/Enabling-Resources

[3] MRP implementation date is November 30, 2023

[4] The members of the Consortium are: Canadian Renewable Energy Association; Axium Infrastructure; BluEarth Renewables; Boralex; Capstone Infrastructure; Cordelio Power; EDF Renewables; EDP Renewables; Enbridge; ENGIE; Evolugen (by Brookfield Renewable); H2O Power; Kruger Energy; Liberty Power; Longyuan; NextEra Energy Canada; Pattern Energy; Suncor; and wpd Canada.

[5] See https://www.ieso.ca/Sector-Participants/Engagement-Initiatives/Engagements/Resource-Adequacy-Engagement

initiative[6], and the past Non-Emitting Resources Sub-Committee (NERSC)[7] of the former Market Renewable Working Group (MRWG).[8]

Within these initiatives, the Consortium commented on the uptake and integration of hybrid projects within wholesale electricity markets across the U.S. and in Alberta.

The subsections below provide high-level comments regarding some of the key components that were presented by IESO during the April 21 webinar, and answers to IESO posed questions.

Potential Opportunity for Hybrid Resources within Ontario

IESO is correct in pointing out on slide 7 that approximately 400 MW of wind and solar generators (i.e., variable generators (VGs)) with expiring contracts (starting in 2026) represent potential opportunities for energy storage projects to be coupled with operating VGs.

On slide 11, the Consortium notes that IESO has highlighted over 400 hybrid projects that have been brought into operation or are being developed across the U.S., totaling approximately 85,000 MW of generation capacity and approximately 11,000 MW of storage capacity. Further, some of these projects have been developed as cost-effective alternatives to some gas-fired generators – with supply capabilities to meet flexibility and operability needs of respective power systems, while addressing resource adequacy needs.

For example, on March 28, 2019, Florida Power & Light (FPL) announced their 409 MW Manatee Energy Storage Center project that will be co-located with an existing FPL solar generator in Manatee County, Florida. This hybrid project will enable accelerated retirement of two FPL gas-fired generators, and will save Florida customers more than $100 million (USD) and eliminate more than 1 million tons of carbon emissions.[9]

As another example, on May 1, 2020, Southern California Edison announced execution of seven contracts for a combined 770 MW of grid-scale battery storage projects (see Appendix A). Most of the winning projects will be co-located with existing solar generators, and purposely being developed to help replace four gas-fired generators that have been ordered to reduce their environmental impact.[10]

[6] See https://www.ieso.ca/en/Sector-Participants/Engagement-Initiatives/Engagements/Completed/Expanding-Participation-in-Operating-Reserve-and-Energy, and applicable Consortium submissions can be found at https://www.ieso.ca/en/Sector-Participants/Engagement-Initiatives/Engagements/Completed/Market-Development-Advisory-Group

[7] See https://www.ieso.ca/en/Market-Renewal/Stakeholder-Engagements/Non-Emitting-Resources-Subcommittee

[8] See https://www.ieso.ca/en/Market-Renewal/Stakeholder-Engagements/Market-Renewal-Working-Group

[9] See https://www.prnewswire.com/news-releases/fpl-announces-plan-to-build-the-worlds-largest-solar-powered-battery-and-drive-accelerated-retirement-of-fossil-fuel-generation-300820312.html

[10] See https://www-greentechmedia-com.cdn.ampproject.org/c/s/www.greentechmedia.com/amp/article/southern-california-edison-picks-770mw-of-energy-storage-projects-to-be-built-by-next-year

On slide 12, IESO lists the following table indicating how all U.S. wholesale electricity markets have on-going initiatives towards facilitating integration of hybrid projects within their respective markets.

ISO/RTO	Forecasting	Market Mitigation/ Physical Withholding	Market Participation & Software Scheduling	Capacity Accreditation and Most Offer Obligation	Offer Parameters	Interconnection	Resource Planning	Metering and Telemetry
CAISO	✓		✓	✓	✓	✓		✓
NYISO			✓	✓			✓	✓
ERCOT	✓	✓	✓		✓	✓	✓	✓
MISO	✓		✓	✓	✓	✓	✓	✓
PJM			✓	✓			✓	✓
SPP				✓			✓	
ISO-NE			✓	✓				✓

Appendix B provides additional information on key initiatives to integrate hybrid projects within select U.S. wholesale electricity markets.

Additional to the U.S. wholesale electricity markets, the Alberta wholesale electricity market is enabling hybrid projects.

For example, on October 15, 2020, TransAlta announced commercial operation of their WindCharger project.[11] The WindCharger project (10 MW) is Alberta's first utility-scale battery storage project. The storage project will be powered by the TransAlta's Summerview II wind generator (66 MW).

Another example of a hybrid project in Alberta is the Drumheller Solar and Battery Storage Project that was granted approval from the Alberta Utilities Commission on April 20, 2020.[12] The co-located solar generator is approximately 13.5 MW and the batter storage is approximately 8 MW.

IESO Requested Stakeholder Feedback

Listed below are IESO posed questions from the April 21 webinar, followed by high-level responses.

Feedback on definitions (Co-located Facility and Hybrid Facility)

Response: the Consortium accepts both definitions, and suggest they could evolve as we learn more throughout the stakeholder engagement

What information do stakeholders need to evaluate the potential of Hybrid Resource investments as we evolve our resource adequacy needs?

[11] See https://www.transaltarenewables.com/2020/10/15/transalta-renewables-announces-commercial-operation-of-windcharger-albertas-first-utility-scale-battery-storage-project/

[12] See https://www.auc.ab.ca/regulatory_documents/ProceedingDocuments/2020/25234-D01-2020.pdf

Response: IESO should provide more power system data and information, specifically system needs and location of these needs, to help distinguish how hybrid projects could best meet these needs; further, clarity within the Resource Adequacy Framework will be needed to better understand which procurement mechanisms (e.g., contracts, etc.) will be used to enable development of hybrid projects

Do the timelines and deliverables for the Hybrid Integration Project make sense?

Response: considering the potential benefits, IESO should more closely examine how the Alberta wholesale electricity market is enabling hybrid projects (as these projects are presently being integrated in this market) towards enabling Ontario-based hybrid projects to participate within IESO's announced forthcoming Request for Proposals to meet mid-term supply needs and in general within the Resource Adequacy Framework

Are stakeholders supportive of the objectives and approach detailed in the draft Hybrid Integration Project Engagement Plan?

Response: the Consortium is supportive of the HIP Engagement Plan

The Consortium will be happy to discuss the contents of this submission with you at a mutually convenient time.

Sincerely,

Jason Chee-Aloy
Managing Director
Power Advisory LLC

cc:
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John O'Neil (Pattern Energy)
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Appendix A – Southern California Edison Grid-Scale Battery Storage Contracted Projects

On May 1, 2020, Southern California Edison announced contracts for the following seven grid-scale battery storage projects. Some of these projects will be co-located with operating solar generators. Part of the driver to contract for these storage projects is to enable retirement of gas-fired generators.

Selected Bidder	Project Name	Project Location	Contract Term (Years)	Contract Capacity (MW)	Commercial Online Date
Southern Power	Garland	Rosamond, CA Kern County	20	88	8/1/2021
Southern Power	Tranquillity	Tranquillity, CA Fresno County	20	72	8/1/2021
TerraGen Power	Sanborn	Mojave, CA Kern County	10	50	8/1/2021
NextEra Energy Resources	Blythe 2	Blythe, CA Riverside County	15	115	8/1/2021
NextEra Energy Resources	Blythe 3	Blythe, Riverside County	15	115	8/1/2021
NextEra Energy Resources	McCoy	Blythe, Riverside County	15	230	8/1/2021
LS Power	Gateway 1-2	San Diego, San Diego County	15	100	8/1/2021

Appendix B – U.S. Wholesale Market Stakeholder Engagement Initiatives to Enable Integration of Hybrid Projects

NYISO and CAISO are the leading U.S. wholesale electricity markets advancing their market design and rules to enable greater integration of hybrid projects.

NYISO Hybrid Storage Model

On January 13, 2020, NYISO kicked of their Hybrid Storage Model stakeholder engagement initiative.[13] By way of background, incentives along with improvements in flexibility and availability are motivating developers and asset owners to increasingly look to couple generators with storage resources. However, NYISO's market design and rules do not presently include a participation model for hybrid projects. Under the present market design and rules, co-located generators and storage resources are required to be separately metered and have their own point identifier.

The Hybrid Storage Model project scope is to define a participation model to enable integration and operations for the following hybrid projects:

- Renewable resources co-located with small energy storage resources;
- Renewable resources co-located with large energy storage resources;
- Thermal resources co-located with energy storage resources; and
- Renewable and thermal resources paired with energy storage resources via financial contracts.

The Hybrid Storage Model project will also explore different aspects related to participation of hybrid projects in the NYISO wholesale electricity market, such as:

- Participation in energy and ancillary services markets;
- Participation in installed capacity markets;
- Settlement process;
- Modeling for interconnection, planning and operations; and
- Metering requirements.

[13] See https://www.nyiso.com/documents/20142/10252714/Hybrid%20Storage%20Model_MIWG_Jan%2013%202019.pdf/caf29abe-a431-a2d1-358d-43326153824a

On October 27 2020, NYISO released the Hybrid Storage Model: Co-located Storage Resources Market Design Proposal.[14] This Proposal will require approvals from relevant stakeholder committees and then FERC approval for implementation.

CAISO Hybrid Resources

On July 18, 2019, CAISO released their *Hybrid Resources Issue Paper*[15] that began their stakeholder engagement initiative to enhance market design and rules to more effectively integrate hybrid projects. CAISO anticipates the installed capacity of hybrid projects will grow significantly over the coming years, as CAISO has observed that the number of hybrid project configurations submitting interconnection requests is growing, and comprising approximately 41% of the total capacity currently seeking interconnection.

The Issue Paper provides background on hybrid projects and begins stakeholder discussions on possible modifications necessary to enable further adoption and participation of hybrid projects. The following subject matters comprise the main sections of the Issue Paper:

- Interconnections;
- Forecasting and operations;
- Markets and systems;
- Ancillary services;
- Deliverability;
- Resource adequacy; and
- Metering, telemetry and settlements.

On October 16, 2020, CAISO released *Hybrid Resources Final Proposal*.[16] The Final Proposal begins by stating that interest in storage within the CAISO wholesale electricity market is significant and growing, as state and federal policymakers and regulators support storage development and believe in its ability to help decarbonize the grid. In California, storage paired with wind and solar generators may reduce reliance on gas-fired generators and help the state achieve its energy policy and climate goals. CAISO has received a significant number of interconnection requests for projects that incorporate stand alone and hybrid resources in response to this direction. CAISO anticipates the quantity of mixed-fuel resources will

[14] https://www.nyiso.com/documents/20142/16364783/Hybrid%20Storage_CSR%20proposal%20overview%20ICAPWG%20MIWG%2010.27.20%20final.pdf/c48cc0e0-c1da-d89c-7f15-6929e590db63

[15] See http://www.caiso.com/Documents/IssuePaper-HybridResources.pdf#search=hybrid

[16] See http://www.caiso.com/InitiativeDocuments/RevisedFinalProposal-HybridResources.pdf#search=hybrid

increase significantly in the coming years. As of late 2020, there was approximately 550 MW of storage and hybrid projects interconnected to the CAISO grid, and CAISO anticipates approximately 1,500 MW additional projects by end of 2021, and continued rapid growth over the next few years. These hybrid projects make up the majority of the interconnection queue for new resources coming onto the system in the future.

The Final Proposal outlines rules for hybrid and co-located projects, including the following:

- Market participation rules;
- Forecasting requirements;
- Ancillary services eligibility;
- Metering requirements; and
- Implications for participation in the resource adequacy program.

This Proposal will require approvals from relevant stakeholder committees and then FERC approval for implementation.