



Katherine Sparkes
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Independent Electricity System Operator
1600-120 Adelaide Street West
Toronto, ON M5H 1T1

October 19, 2021

Dear Katherine,

This submission responds to the Independent Electricity System Operator's (IESO's) September 21, 2021 presentation *Enabling Resources – Update & Hybrid Integration Project: soliciting stakeholder input on potential foundational hybrid participation models*.¹

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"²). The Consortium continues to support the Hybrid Integration Project (HIP) initiative.

The section below provides comments regarding IESO's proposed options to establish a Foundational Participation Model for hybrid projects (e.g., renewable generator paired with energy storage, etc.) to be integrated within the IESO-Administered Markets (IAM). The last section identifies points raised within the Consortium's submission dated July 14, 2021.

Foundational Hybrid Participation Models

As a starting point to define potential Foundational Hybrid Participation Models (i.e., "Foundational Models") within IAM, the Consortium generally agrees with the identification and description of:

- Model 1 – Interim Storage Model + Generator Resource; and
- Model 2 – Single Resource w/ Non-Dispatchable Load.

Considering that all Consortium members are active across multiple wholesale electricity markets in Canada and the U.S., and Consortium members are operating energy storage facilities and are active within discussions to enhance integration of hybrid projects across these markets, the Consortium is familiar with both identified Foundational Models.

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

²The members of the Consortium are: Canadian Renewable Energy Association; Axium Infrastructure; BluEarth Renewables; Boralex; Capstone Infrastructure; Cordelio Power; EDF Renewables; EDP Renewables; Enbridge; ENGIE; Evolgen (by Brookfield Renewable); H2O Power; Kruger Energy; Liberty Power; Longyuan; NextEra Energy Canada; Pattern Energy; Suncor; and wpd Canada.

As described within the U.S. Federal Energy Regulatory Commission's (FERC's) *Hybrid Resources White Paper* (May 2021),³ “co-located hybrid resources” generally describes Model 1 and “integrated hybrid resources” generally describes Model 2.

The Consortium strongly recommends that IESO maintain both Model 1 and Model 2 as two distinct Foundational Models and therefore not choose either as the single Foundational Model. Listed below are reasons to support this position.

- The majority of generators (not rate-regulated) are under contract with IESO. To better enable potential for these generators to explore development and then potentially co-locate and integrate energy storage on-site, Model 1 best ensures that contract provisions will not need to be amended regarding the generator portion of the hybrid project. That is, it will be simpler to co-locate energy storage with generators if separate meters were retained in accordance with provisions already being adhered to within contracts and the IESO Market Rules and Market Manuals.
- Whether still under contracts or when contract terms expire, based on already configured generators, in some circumstances it may be clearly easier to co-locate and integrate energy storage with separate meters for the storage portion of the hybrid project, and in other cases (likely more so after contract terms expire) it may be easier to co-locate and integrate energy storage using the existing generator meter.
- Despite some of the practical realities listed within the above two points, Model 1 could be comparably more complicated to manage than Model 2. This will likely be the case because market participants (MPs) will need to manage two offers (one for the generator, one for the storage facility when supplying energy, etc.) and one bid (for the storage facility when withdrawing energy). As was the case during the initial years post the May 2002 opening of IAM, prior to the introduction of a facility aggregation framework, many hydroelectric generators and combined-cycle gas-fired generators were extremely challenged in managing multiple offers for a single resource – which, in many cases, resulted in less efficient and less optimal production of energy and operating reserve (OR).
- Building on the point above, considering the combination of two offers and one bid, it will be very likely that MPs will not be able to fully optimize utilization of their hybrid project to supply multiple electricity products and services (e.g., energy, OR, capacity, etc.) because they will need to manage compliance for these multiple offers and bid while ensuring operability of hybrid projects. This was certainly the case for many hydroelectric generators and gas-fired generators prior to IESO implementing a facility aggregation framework.

³ See <https://www.ferc.gov/sites/default/files/2021-05/white-paper-hybrid-resources.pdf>

- Model 2 provides enhanced capabilities for MPs to better manage their hybrid projects and therefore fully optimize their utilization of their project to supply multiple electricity products and services.
- Regarding supply of ancillary services (e.g., OR, regulation, reactive support and voltage control), Model 2 will provide the same capabilities as Model 1, therefore neither Foundational Model has advantages over the other in this respect.
- As conveyed in FERC's *Hybrid Resources Whitepaper* (May 2021), many wholesale electricity markets are permitting both "co-located hybrid resources" (i.e., Model 1) and "integrated hybrid resources" (Model 2).
- As described by IESO during the September 21 webinar presentation, Model 1 and Model 2 do not require changes to IESO software, systems, and tools. Therefore, barriers relating to changes to IESO software, systems, and tools do not appear to exist, which should help development of both Model 1 and Model 2 as two distinct Foundational Models.
- As further supported within Consortium requests posed in the section below, it appears that much work still needs to be done to integrate hybrid projects within IAM. This provides additional rationale why IESO should not choose between Model 1 and Model 2 at this time (i.e., selection of a single Foundational Model for November 2021 is much too early, and as recommended by the Consortium both Model 1 and Model 2 should be implemented). Therefore, the Consortium recommends that IESO leverage work already done and ongoing within the Canadian and U.S. wholesale electricity markets. The FERC's *Hybrid Resources Whitepaper* (May 2021) provides an excellent account of what the U.S. wholesale electricity markets have learned and accomplished towards integrating hybrid projects and what further work is required to improve their integration.

Consortium Points Raised within July 14 Submission

Regarding IESO's June 23, 2021 presentation, *Hybrid Integration Project*,⁴ the Consortium is still seeking responses from IESO regarding the following points raised in our July 14, 2021 submission.

On slide 8, IESO listed the following table identifying hybrid projects in connection queues across select Canadian and U.S. wholesale electricity markets.

⁴ See <https://www.ieso.ca/en/Sector-Participants/Engagement-Initiatives/Engagements/Hybrid-Integration-Project>

Deliverable	Hybrid Facility MW Generation in Build Queue As of 2020	Total MW of Generation in Build Queue as of 2020	% Hybrids In Build Queue as of 2020
AESO	1,531	17,493	9%
CAISO	46,840	122,434	38%
ERCOT	16,097	107,880	13%
ISO-NE	474	23,843	2%
MISO	12,219	92,057	13%

1. The Consortium requests that IESO provide similar data and information for hybrid projects within connection queues in the following Canadian and U.S. wholesale electricity markets administered by: IESO; NYISO; PJM; and SPP, along with explanations why material deviations in the volume of developing hybrid projects may exist from market to market.

On slide 23, IESO noted the following research has been initiated through:

- Understanding current hybrid project growth in U.S. and what it means for upcoming work of the HIP initiative;
- Learning from early-stage implementation efforts already taking place by U.S. Independent System Operators (ISOs)/Regional Transmission Organizations (RTOs) within their respective wholesale electricity markets; and
- Conducting one or more proof-of-concept hybrid project ‘field’ studies in Ontario.

2. The Consortium requests IESO to provide more information regarding related research within a future HIP stakeholder engagement meeting before the end of 2021.

IESO Requested Stakeholder Feedback

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

How would your willingness to participate in IESO markets and invest in the development of hybrid facilities vary under each proposed model?

Response: see response above – particularly relating to the tradeoff of Model 1 potentially being favored while generators are under contracts and Model 2 potentially being favored when hybrid projects are being developed in the future without co-location and integration of energy storage with an already operating generator

What other operational or implementation considerations should the IESO factor into its decision-making about which foundational model to implement?

Response: see points in the section above



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

Sincerely,

A handwritten signature in black ink, appearing to read "J. Chee-Aloy", enclosed within a thin black rectangular border.

Jason Chee-Aloy
Managing Director
Power Advisory LLC

cc:

Leonard Kula (IESO)
Chuck Farmer (IESO)
Candice Trickey (IESO)
Shawn Cronkwright (IESO)
Barbara Ellard (IESO)
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Elio Gatto (Axiom Infrastructure)
Roslyn McMann (BluEarth Renewables)
Adam Rosso (Boralex)
Greg Peterson (Capstone Infrastructure)
Paul Rapp (Cordelio Power)
David Thornton (EDF Renewables)
Ken Little (EDP Renewables)
Lenin Vadlamudi (Enbridge)
Michelle Dueitt (ENGIE)
Julien Wu (Evolugen by Brookfield Renewable)



Stephen Somerville (H2O Power)
JJ Davis (Kruger Energy)
Deborah Langelaan (Liberty Power)
Jeff Hammond (Longyuan)
Cheryl Dietrich (NextEra Energy)
Rob Campbell (Pattern Energy)
Chris Scott (Suncor)
Ian MacRae (wpd Canada)