Stakeholder Feedback and IESO Response

Hybrid Integration Project – January 27, 2022

Following the January 27, 2022 engagement webinar on the Hybrid Integration Project (HIP), the Independent Electricity System Operator (IESO) received feedback from participants on the proposed "day-in-the-life" for the foundational hybrid facility models, including any concerns from a participation perspective, as well as any dependencies between resources or technologies the IESO should be accounting for.

The IESO received feedback from:

- Electricity Distributors Association (EDA)
- Energy Storage Canada (ESC)
- Evolugen by Brookfield Renewable (Evolugen)

The presentation materials and stakeholder feedback submissions have been posted on the Hybrid Integration Project webpage. Please reference the material for specific feedback as the below information provides excerpts and/or a summary only.

Notes on Feedback Summary

The IESO appreciates the feedback received from stakeholders. The IESO has provided a summary below, which outlines specific feedback or questions for which an IESO response was required at this time.

Day-in-the-life Participation

"Did you see any concerns from a participation perspective for co-located or integrated facilities?"

Two stakeholder submissions indicated no concerns from a participation perspective for co-located or integrated facilities. One submission did however include a clarifying question, and another included a number of points for consideration. These points are summarized in the table below.

Feedback	**IESO Response**
Evolugen: We encourage the IESO to clearly communicate how hybrid resource pairs would qualify in capacity markets and other procurement mechanisms. Please provide examples and case studies if possible.	Thank you for this feedback. In response to stakeholder feedback, the IESO provided additional information to address capacity qualification in the stakeholder engagement materials for the February 24, 2022 session, which were prepared in co-ordination with IESO Procurement staff. Procurement updates that may impact hybrid facilities will be highlighted during this engagement. For additional clarity, the IESO's UCAP process is expected to de-rate ICAP based on the top 200 hours of historical or fleet data. The IESO will not double count the de-rate data. • UCAP = ICAP less de-rates based on historical data. If no historical data is available, fleet average is used for de-rate. • ICAP is provided by the participant based on nameplate capacity adjusted, if applicable, for non-fuel ambient conditions such as temperature. For example, if - as a result of the air temperature - a resource has different output given the same amount of fuel (wind/sun), this will be reflected in different ICAPs seasonally. • ICAP is not related to fuel availability, which is addressed in the historical data or fleet average capability. • Wind facilities are usually not impacted by ambient conditions, so generally the nameplate capacity = ICAP. Solar facilities may be more impacted by ambient conditions.

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Evolugen: More clarity on the evolution of ancillary service procurements (e.g., via markets? RFPs?) would help investment decisions.	The IESO currently enters into bi-lateral contracts for ancillary services other than operating reserves. The IESO continuously conducts review of the level of ancillary services requirements for system needs and when necessary, will proceed with an appropriate procurement process for additional resources. At this time, there are no plans for procurement of additional ancillary services due to system needs. The IESO supports a competitive, transparent and robust ancillary service market to ensure ratepayer value and the continued stable and reliable operation of Ontario's electricity grid. As needs change, as the Ontario markets continue to evolve and when appropriate, the IESO will consider shifting the acquisition of ancillary services from a procurement-based approach to a market-based approach, such as the possible inclusion of Regulation service into the optimization of the energy and operating reserve markets. Until such times, the IESO will continue to seek opportunities to implement competitive procurement processes for any additional ancillary services requirements.
Evolugen: We also encourage the IESO to provide more real-life examples in its engagements—similar to the "day-in-the-life" case studies—of how a hybrid resource might operate and offer in the various markets. It would also be helpful if the IESO could explore how a hybrid "storage+" asset would operate and offer in a side-by-side comparison with hydro-resources with storage capabilities.	Thank you for this feedback. Since operators may have different objectives and strategies, the IESO is not able to address bid/offer behaviour and potential market outcomes. However, we can review and discuss any specific concerns about how hybrid facilities would participate in the IESO markets, if further clarity is required. Participation of a hybrid facility is very different from the participation of a hydroelectric facility, so a comparison is not beneficial. Hydro facilities under the renewed market are provided with a number of new parameters that help to address ongoing issues with safety, equipment damage and applicable laws (SEAL), and which the IESO expects will help to properly model these resources. These parameters do not apply to

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	variable generation or other quick-start generation or storage facilities.
Evolugen: We look forward to future discussions on how to remove GA and other fees for storage devices—while storage facilities do charge from the grid, they ultimately return the same energy to help system needs and do not consume it, and should therefore not be treated as load.	Thank you for this feedback. The IESO provided additional information to clarify treatment for global adjustment and uplifts in the stakeholder engagement materials for the February 24, 2022 session. As discussed, the long-term storage design project recommended that storage be exempt from uplift for energy withdrawn for the purpose of re-injection for market efficiency reasons, and should apply to storage under hybrids as well. The timing of implementation is being considered by the IESO, and changes to uplift allocation may require further analysis to ensure the design is appropriate. Global Adjustment (GA) charges are determined as per Ontario Regulation 429/04, and therefore are not under the control of the IESO to change. However, under the co-located model, GA may be reimbursed based on injections for Class B market participants with a storage facility, and the storage load may be eligible for Class A after the first base period. An existing storage resource that adds generation under the co-located model would maintain its current GA treatment. For the integrated model, the storage technology shares a meter with the generator, so does not meet the definition for a storage facility under the regulation and will not be reimbursed for injections as Class B. However: • the storage load may be eligible for Class A treatment after the first base period, limiting the impact of GA; and • the participant may also charge storage BTM, which is not subject to GA. The IESO recognizes that the GA regulation may need to be updated to consider the integrated hybrid facility where it appears the Class B

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	reimbursement does not apply. This issue has been identified by the IESO to the Ministry of Energy.
Evolugen: Hybrid integration models consider the possibility of adding storage to an existing variable generation ("VG") facility. Given that such VG facilities are likely to be under-contract and/or looking to re-contract via future RFPs, the IESO should consider flexible contracting mechanisms to encourage investors to pair storage devices to existing facilities. For example, the IESO could incentivize storage investments if a VG's existing contract terms could apply to an increase in its capacity factor and energy delivery, as well as a reduction in curtailment resulting from storage pairing. In contrast, having to negotiate separate agreements for the storage device alone (even though the storage would be paired with an existing VG) might not be attractive to investors. The IESO should allow investors to choose either option. We support the IESO's proposal in the LT-RFP to provide energy revenue certainty via Contract for Differences. Longer-term capacity contracts combined with Contract-for-Differences to account for energy payments would protect both the IESO and the investor—providing reasonable revenue certainty to lower risks would ultimately benefit the ratepayers.	Thank you for this feedback, which has been shared with the Procurement team at the IESO. The IESO will these considerations at upcoming Long-Term RFP engagement meetings. Procurement-related matters, such as contracting considerations, will be addressed through Procurement stakeholder engagement: https://www.ieso.ca/en/Sector-Participants/Engagement-Initiatives/Engagements/Long-Term-RFP
Evolugen: Unreasonable Market Power Mitigation rules would arbitrarily lower a hybrid resource's offered price, which distorts price signals in constrained zones where storage resources can be easily deployed to help reliability. Such out-of-market interventions would discourage: a) market participants from investing in storage devices where needed, and b) storage operators from accurately responding to price volatility. This represents a considerable	Thank you for this feedback. The IESO provided additional information to clarify the purpose and intended impacts of the market power mitigation (MPM) framework in the stakeholder engagement materials for the February 24, 2022 session. For further clarity, the maximum daily energy limit parameter is not subject to MPM because it may fluctuate significantly from day to day, unlike other non-price parameters that are

Feedback	IESO Response
energy revenue risk and a serious barrier to investment.	subject to MPM. Participants will be required to provide a reason code for using this parameter; for a storage facility with state-of-charge restrictions, the reason code is expected to be "fuel limitations".

"Are there any dependencies between resources or technologies that make up the hybrid models that the IESO should be accounting for?"

Stakeholder submissions from EDA and ESC did not identify any dependencies between resources or technologies that the IESO should be accounting for. The submission from Evolugen included a point for consideration which is detailed in the table below.

Feedback	IESO Response
Evolugen: Adding storage might require increasing the interconnection limit and other technical constraints of an existing VG facility for the new "storage+" pair to provide as much grid benefits as possible. The IESO should design fast-tracked processes to modify interconnection limitations to enable storage investment.	Existing processes are able to efficiently and effectively address modifications for hybrid facilities on a case-by-case basis. Please refer to Market Manual 1.4 at the link below for an overview of the Connection Assessment and Approval Process, as well as the guidelines for an Expedited System Impact Assessment (ESIA). Detailed information regarding ESIA is included in Section 9 of the Market Manual. The CAA process allows the IESO to assess the impact of new or modified connections to the IESO-controlled grid on reliability of the integrated power system. The System Impact Assessment (SIA) is a mandatory assessment conducted by the IESO. If the IESO determines, based on specified guidelines, that a detailed study is not required, an ESIA which involves a simple study will be performed. https://www.ieso.ca/-/media/Files/IESO/Document-Library/Market-Rules-and-Manuals-Library/market-manuals/connecting/caa.ashx

General Comments/Feedback

All three stakeholder submissions included additional feedback and/or general questions, which are included in the table below.

Feedback	IESO Response
EDA: • Overall, the EDA is supportive of the IESO's Hybrid Integration Project. We believe there is benefit in leveraging existing renewable generation assets – by expanding them, firming their capacity with storage and providing them with flexibility to choose to participate in the IAM. • The EDA seeks clarity on matters pertaining to distribution connected generation facilities that will be eligible to become a hybrid facility and an IESO Market Participant (e.g., metering, settlement, payment, the applicability of the OEB's Distribution System Code, etc.). • Therefore, the EDA respectfully requests additional clarity on the following issues pertaining to an embedded retail generator converting to a hybrid facility and the future development of new hybrid facilities connected to the distribution system: 1. Will the embedded retail generators be required to notify the LDC and the IESO if they propose to become a hybrid facility? 2. Which party is responsible for metering infrastructure and the costs to complete any required changes when converting an existing embedded retail generator to a hybrid facility? 3. What is the LDC's role and duties to FIT/RESOP contract holders after they convert to a hybrid facility (e.g., settlement duties, role in facilitating payments)? 4. Since a FIT/RESOP generator that becomes a hybrid facility will be connected to the LDC's grid, please confirm that the LDC will continue to have visibility of the facility, post-conversion to a hybrid facility? Will LDCs have visibility of new hybrid facilities connected to the distribution system?	Thank you for this feedback. The process to become authorized to participate in IESO markets is described in IESO market rules and market manuals. An entity must complete all authorization and registration requirements in order to participate in the IESO-administered markets, including the connection assessment and approval (CAA) process, facility registration and revenue meter registration. The process for a distribution-connected facility to participate as an embedded facility would be the same for both hybrid and non-hybrid facilities. Note that an embedded facility participating in the IESO administered markets must also meet any applicable requirements of the LDC. In response to the EDA's specific questions: 1. An embedded retail generator is required to follow the IESO process to participate directly in IESO markets, starting with contacting the IESO to apply for authorization to participate and to initiate the CAA process. The IESO does not have specific knowledge regarding LDC requirements for notification of a change from embedded retail generator to embedded IESO generator. 2. The prospective IESO market participant is responsible for metering infrastructure and the costs to complete any required changes to allow an existing embedded retail generator to participate as an embedded IESO generator. The participant is similarly responsible for infrastructure/ metering required to add embedded storage and participate as an embedded hybrid facility in the IESO administered markets. 3. If an embedded retail generator with a FIT/RESOP contract should become an IESO market participant (whether or not

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5. How can a distribution connected hybrid facility be utilized to provide distribution grid services to an LDC (i.e., as a non-wires alternative)?	embedded storage is added at the same connection point), the IESO will be responsible for IESO market settlement. The IESO does not currently have a process for changing administration of FIT/RESOP contract payments, and will work with LDCs to address this matter if an embedded retail generator with a contract becomes an IESO market participant. 4. The LDC will have the same visibility of a FIT/RESOP embedded generator that becomes a hybrid facility, or a brand-new embedded hybrid facility, as it does other embedded facilities that are under an IESO market participant. The IESO does not have specific knowledge regarding current LDC visibility of embedded facilities that participate in the IESO markets. 5. A distribution-connected hybrid facility cannot be utilized to provide distribution grid services to an LDC, at the same time providing grid services to the IESO as a market participant. The provision of energy and capacity services to the LDC for local needs using an embedded retail hybrid facility is not in scope of this project, which is enabling hybrid facilities to provide IESO grid services. However, the EDA could provide further input to the Transmission-Distribution Coordination Working Group of the IESO. In addition, the IESO Grid Innovation Fund/ OEB Sandbox Joint Targeted Call for distributed energy resource projects is another avenue where these issues are being explored. https://ieso.ca/en/Sector-Participants/Engagement-Initiatives/Engagements/Transmission-Distribution-Coordination-Working-Group
ESC:	Thank you for this feedback.

Feedback	IESO Response
• ESC is supportive of IESO's foundational models recognizing that they leverage existing tools and processes such that hybrids will be enabled for the first LT RFP. We also appreciate the 'day-in-the-life' approach to review the concepts in more detail. IESO has incorporated stakeholder feedback into the design and optionality for the two models.	
Evolugen: • Please clarify whether these different time zone conventions are correct: on slide 8 "By 10:00 EPT day-ahead" and on slide 9 "from 20:00 EST Day-ahead."	Yes, this information is correct. The Day-Ahead Market (DAM) needs to be aligned with the year-round gas nomination deadline of 14:00 EPT so that natural gas resources can base fuel supply decisions on already determined day-ahead schedules. To help achieve this alignment, the DAM will use Eastern Prevailing Time (EPT), also known as Eastern Daylight savings time (EDT), rather than Eastern Standard Time (EST) which is currently used by DACP. The DAM will run after the EPT submission window for bids and offers closes. The Real-Time Market, however, will continue to operate according to Eastern Standard Time (EST) as it does today.
Evolugen: • In relation to the Ministerial directive for the IESO to evaluate the possibility of a Clean Energy Registry: please consider how the environmental attributes of a "storage+" device that both charges from its VG (i.e., no emission) and the grid (i.e., mixed-emissions profile) would be accounted for.	The Clean Energy Credits (CEC) stakeholder engagement was launched on February 3, 2022. See link below. This feedback will be shared with the IESO team spearheading that initiative. IESO will be reporting back to the Ministry on CEC design considerations and options in July 2022. IESO is currently receiving feedback through its CEC engagement; CEC-related feedback can be submitted through the CEC engagement. https://www.ieso.ca/en/Sector-Participants/Engagement-Initiatives/Engagements/Clean-Energy-Credits