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May 12, 2021

Dear Katherine,

This submission responds to the Independent Electricity System Operator (IESO) April 21, 2021 presentation, *Enabling Resources Engagement*,<sup>1</sup> that launched a new IESO stakeholder engagement initiative.

The scope of this initiative is to produce an integrated workplan that will outline sequencing, timing, and scope of activities to be undertaken by IESO to enable existing resources to provide electricity products and services that they cannot, or cannot fully, provide under the current design and rules of the IESO-Administered Markets (IAM). The Enabling Resources initiative is planned to be implemented post Market Renewal Program (MRP) implementation.<sup>2</sup>

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"<sup>3</sup>).

The Consortium supports the Enabling Resources initiative. Over the last few years, the Consortium has supported similar IESO stakeholder initiatives, such as the Expanding Participation in Operating Reserve and Energy (EPOR-E)<sup>4</sup> and the Non-Emitting Resources Sub-Committee (NERSC)<sup>5</sup> of the former Market Renewable Working Group (MRWG).<sup>6</sup> Within these initiatives, the Consortium had commented on the capabilities of wind and solar generators (i.e., variable generators (VGs)), and energy storage facilities, to supply multiple ancillary services, and the U.S. and European electricity markets permitting such supply.

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<sup>1</sup> See <https://www.ieso.ca/en/Sector-Participants/Engagement-Initiatives/Engagements/Enabling-Resources>

<sup>2</sup> IESO has stated that MRP implementation date is November 30, 2023

<sup>3</sup> The members of the Consortium are: Canadian Renewable Energy Association; Axiom 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.

<sup>4</sup> 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>

<sup>5</sup> See <https://www.ieso.ca/en/Market-Renewal/Stakeholder-Engagements/Non-Emitting-Resources-Subcommittee>

<sup>6</sup> See <https://www.ieso.ca/en/Market-Renewal/Stakeholder-Engagements/Market-Renewal-Working-Group>

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.

### **Resource Enablement Opportunities and Opportunity Assessment**

On slide 7, regarding “enhancement/enablement potential” for applicable resources (e.g., VGs, storage, etc.), it is not clear how IESO determined respective electricity products/services (e.g., operating reserve (OR)) that could be supplied by the listed resources. For example, VGs and hybrid resources (i.e., VGs coupled with storage) have capabilities to provide other ancillary services in addition to OR. Therefore, IESO should explain how “enhancement/enablement potential” was determined and why other ancillary services were not included. For example, Appendix A lists capabilities of wind generators to supply multiple electricity products and services, referenced from a January 2019 National Renewable Energy Laboratory (NREL) report titled *An Introduction to Grid Services: Concepts, Technical Requirements, and Provision from Wind*.<sup>7</sup>

The Consortium agrees with IESO that VGs coming off contracts (starting in the mid 2020s) will present opportunities to meet Ontario’s future supply needs. However, on slide 23, IESO needs to clearly specify how up to approximately 500 effective MW was derived relative to the approximate 4,200 MW of operating transmission-connected VGs, for purposes of setting a benchmark for these resources.

Similar comments apply to how IESO derived up to approximately 1,000 MW distributed energy resources (DERs) that could be available from 2021 to 2035, potential to increase by approximately 500 MW of hybrid VGs and storage based on the approximate 4,200 MW of VGs, and approximately up to 50 MW of energy storage potential, on slides 27 through 29 respectively.

Therefore, the Consortium believes after the above points are clarified, combined with more detailed review of the capabilities of VGs, energy storage, and hybrid resources to supply multiple ancillary services, IESO should revisit their conclusions captured in slide 30 regarding the “opportunity assessment summary”.

### **IESO Requested Stakeholder Feedback**

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

Are there resource enablement opportunities missing from analysis?

*Response: see above points regarding capabilities of VGs, energy storage, and hybrid resources to supply multiple ancillary services*

Is the prioritization and sequencing approach sound and is there clear alignment between the approach and the analysis presented?

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<sup>7</sup> See <https://www.nrel.gov/docs/fy19osti/72578.pdf>

*Response: the scope of work and process proposed by IESO makes sense, but as stated above, clear understanding how IESO reached conclusions to the capabilities to supply multiple electricity products/services is required, and clarity is required how IESO derived MW capabilities for resources as listed within the “opportunity assessment summary”*

Do stakeholders have additional information or comments on input assumptions for consideration (e.g., limited resource life after contract expiration, additional contribution to meeting local system needs)?

*Response: in general, the operation life of contracted VGs extend multiple years beyond contract expiries, and many of the sites of these VGs could enable coupling with energy storage to form hybrid resources – further, it is important to enable multiple revenue streams capturing the technical capabilities of VGs, energy storage, and hybrid resources to supply multiple electricity products and services, as well as supply of non-electricity products (e.g., hydrogen, etc.), which provide needed clarity towards ensuring effective maintenance and potential development (e.g., uprates) on existing resources towards future operations post expiry of contracts*

Do stakeholders agree with the prioritization outcomes?

*Response: see above points regarding IESO conclusions listed under the “opportunity assessment summary”*

Are there any additional timing considerations IESO should be aware of (e.g., time-sensitive resource re-investment decisions)?

*Response: since the first transmission-connected wind generator contract expires in 2026, timing to implement the Enabling Resources initiative post MRP implementation can work – but will need to be revisited if the timeline to implement MRP slips into 2024 or beyond, and brought in-line to enable implementation in time for expiry of the first VG contracts*

Are stakeholders supportive of the objectives and approach detailed in the draft Enabling Resources Engagement Plan?

*Response: the Consortium is supportive of the Enabling Resources 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:

Terry Young (IESO)  
Leonard Kula (IESO)  
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Adam Rosso (Boralex)  
Greg Peterson (Capstone Infrastructure)  
Paul Rapp (Cordelio Power)  
David Thornton (EDF Renewables)  
Ken Little (EDP Renewables)  
Lenin Vadlamudi (Enbridge)  
Carolyn Chesney (ENGIE)  
Julien Wu (Evolugen by Brookfield Renewable)  
Stephen Somerville (H2O Power)  
JJ Davis (Kruger Energy)  
Deborah Langelaan (Liberty Power)  
Jeff Hammond (Longyuan)  
David Applebaum (NextEra Energy)



John O'Neil (Pattern Energy)

Chris Scott (Suncor)

Ian MacRae (wpd Canada)

## Appendix A – Capabilities of Wind Generators to Supply Multiple Electricity Products and Services

Contained within the January 2019 NREL report, *An Introduction to Grid Services: Concepts, Technical Requirements, and Provision from Wind*, the table below clearly shows the technical capabilities of wind generators to supply multiple electricity products and services.<sup>8</sup>

**Table 16. Grid Services and Provision from Wind**

| <b>Service</b>             | <b>Market Procured and Compensated Service?</b> | <b>Wind Can Technically Provide?<sup>a</sup></b> | <b>Wind Currently Provides in U.S.?</b> | <b>Requires Pre-Curtailment for Wind to Provide?</b> |
|----------------------------|---|--|---|--|
| Capacity                   | Y   | Y  | Y                                       | N  |
| Energy                     | Y   | Y  | Y                                       | N  |
| Inertial Response          | N   | Y  | N/A                                     | No <sup>b</sup>                                      |
| Primary Frequency Response | Required but not compensated – proposals only   | Y  | Limited                                 | Y  |
| Fast Frequency Response    | N – proposals only                              | Y  | Limited                                 | Y  |
| Regulating Reserves        | Y   | Y  | Limited                                 | Y  |
| Contingency – Spinning     | Y   | Y  | Limited                                 | Y  |
| Contingency – Non-spinning | Y   | Y  | No                                      | Y  |
| Contingency – Replacement  | Y   | Maybe  | No                                      | Y  |
| Ramping Reserves           | Y (some locations)                              | Y  | Limited                                 | Y  |
| Voltage Support            | Y – cost of Service                             | Y <sup>c</sup> – location dependent              | Limited                                 | N  |
| Black-Start                | Y – cost of Service                             | Unclear, location dependent                      | No                                      | N  |

<sup>8</sup> See p. 45 from <https://www.nrel.gov/docs/fy19osti/72578.pdf>