Feedback Form

Electricity Planning in the West of London Area – November 26, 2020

Feedback Provided by:

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Windsor-Essex Integrated Regional Resource Plan Addendum Study

Topic	Feedback
What feedback do you have regarding any of the options proposed?	See general comments below

Topic	Feedback
What other information should be considered in the continued development of these solutions leading up to the recommendations?	See general comments below

West of London Bulk Study

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General Comments/Feedback

The IESO is seeking feedback on the options presented in the webinar as well as suggestion on information to assist the planning process.

Introduction

EDF Renewables Inc. (**EDFR**) would like to thank you and the team at the Independent Electricity System Operator (**IESO**) for launching an addendum study and hosting an additional discussion regarding the Windsor-Essex Integrated Regional Resource Plan (**IRRP**).

EDFR has been following this regional need since the IESO began the IRRP review process in Summer 2019, and EDFR has attempted to better understand the system need in the Windsor-Essex region, as well as refining the potential opportunities for EDFR to find innovative ways to offer our services to assist in addressing those need.

As a review and confirmation of our understanding, the following is a summary of the primary issues the regional power system in Windsor-Essex is facing over the next decade. Load growth in the region is growing at an unprecedented pace and has resulted in several immediate investments to maintain system reliability, as per the requirements of the Ontario Resource and Transmission Adequacy Criteria (**ORTAC**). Specifically, a new Leamington Switching Station (**SS**) and transmission circuits from Chatham SS and Leamington SS are under development and expected to add ~1,000 MW of transfer capability for the Windsor-Essex region. In addition to addressing the needs of load growth, investments in the Winsor-Essex region are also required to maintain and enhance the intertie capability with Michigan that is located near Windsor. Beyond the planned expansions, the IRRP analysis sees a potential for load growth to exceed the new transfer capacity and therefore new resources and/or system investments will be required.

As discussed in our submissions and subsequent meetings with IESO, EDFR believes that grid-scale solar PV and energy storage systems (**ESS**) could assist in meeting this regional power system need in addition to global supply needs Ontario is expecting by the mid-2020s.

However, despite best efforts to date EDFR must suggest that more work is required by the IESO to ensure greater transparency and fairness in any future process in order to arrive at the most efficient outcomes for the region and the provincial grid.

This would include:

- Sharing additional data (as outlined below) with all interested parties to even the playing field and improve the quality of solutions brought forward;
- Improve broader stakeholder involvement in solutions-setting throughout the process to ensure it is not inherently biased towards wires/utility solutions;
- Consider the full potential of non-wires options, including largescale generation and/or storage solutions which can be quickly deployed, are easily scalable, and reduce ratepayer risk; and,
- Integrate potential solutions from this zone with the need for future capacity province-wide (or even within the Windsor-Essex zone as applicable). This will ensure we are not over building Ontario's electricity infrastructure when one integrated solution could solve both requirements thereby reducing overall system costs.

However, from our experience working across North America, EDFR would strongly suggest to the IESO that the work required to identify and share necessary information pertaining to this specific regional need to the market, and complete a competitive Request for Proposals (RFP) process is achievable before the end of 2021. As a corollary, EDFR would suggest from a development perspective (i.e. siting, interconnection, project design, financing, etc.) waiting longer than 2021 could impact the ability for the IESO to meet the emerging regional capacity need in 2025, and stall much needed economic growth and investment in Ontario that is driving this load growth.

ESS Benefits

There are several attributes and characteristics of grid-scale energy storage that EDFR believes would be beneficial for the IESO to consider when assessing grid-scale electricity supply solutions in the Windsor-Essex region:

Flexibility:

- Battery-based energy storage (**BESS**) have fast ramp rates and therefore are extremely flexible at responding to system conditions or operator dispatch signals. As an inverter-based connection arrangement, BESS can provide voltage support during system disturbances by independently controlling the reactive and active power output of the BESS.
- In addition, BESS can be dispatched to meet ramping needs, such as when variable renewable energy resource outputs fluctuate.

ESS Scalability:

- The capacity (i.e., MW of max output) and energy (i.e., MWh of continuous output) can be customized for the power system need; therefore, scaling appropriately for both local and global power system needs.
- The BESS can be installed in phases that align with the growth of the power system. This means that the BESS can be built to match the highly uncertain load growth projects in Windsor-Essex. For example, the energy and capacity of the BESS can be expanded to match load growth on an annual basis to minimize overbuild.
- If load growth does not materialize, further expansion can be abandoned for the benefit of Ontario's ratepayers. Traditional wires capacity is chunky (i.e., large MW steps for each transmission expansion) and pushes a significant amount of risk onto rate-payers both in terms of overbuild and the lifetime of the asset (e.g., transmission assets have an operating life of 40 & 50 years, underutilized transmission assets can therefore burden ratepayers for a generation).

ESS Adaptability:

- Energy storage resources can offer multiple electricity services from a single facility (i.e., value stacking). This can reduce the cost to ratepayers for reliability services (e.g., peak capacity supply) since additional revenue streams can be used to fund the project. For example, the capacity of the BESS can be used for both regional supply needs in addition to global supply needs (e.g., through participation in the IESO's Capacity Auction).
- The future is hard to predict and the ability to adapt the primary use of the BESS for different power system needs offers significant adaptability benefits and reduces the need to fund additional resources. In other words, there is limited to no risk of stranded asset since the BESS can be re-purposed at any time to provide another function to the power system (e.g., global capacity need, ancillary services, etc.)

ESS Innovation:

- The IESO is seeking to innovate to maintain the cost-effectiveness and reliability of Ontario's power system. Energy storage resources are a key part of future innovation in Ontario's electricity sector.
- A grid-scale energy storage project would offer the IESO an excellent example resource to assess the benefit, costs, opportunities and risks to the electricity grid, market design and broader regulatory framework.

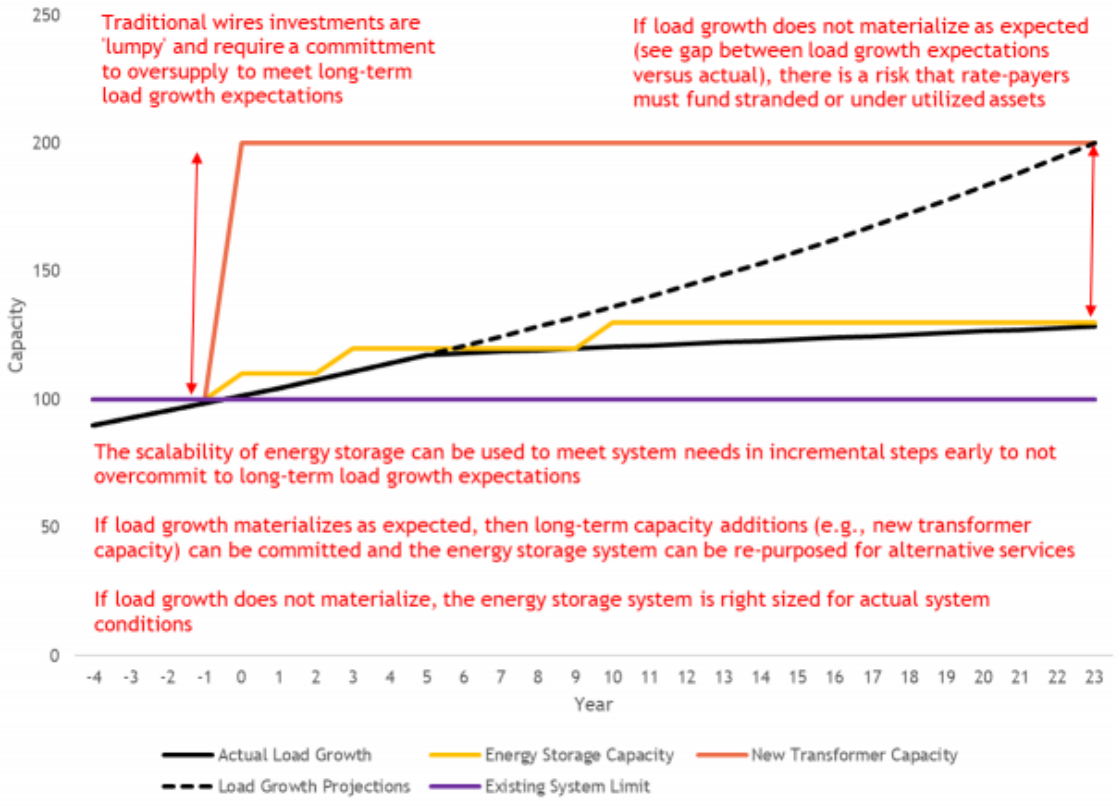
The Supply Option

With respect to the West of London (**WOL**) Bulk Study, the IESO has proposed taking a two-staged approach. The goal of the first stage is described as "ensur(ing) sufficient bulk transfer capability East of Chatham to supply the forecasted load; and improv(ing) the deliverability of existing generation in the Lambton-Sarnia area." The main alternatives to address Stage 1 are identified as:

1. Reinforce the Lambton x Chatham Corridor; and
2. Local 650MW generation/storage West of Chatham

As mentioned above, a generation option like solar PV and ESS has the benefits of being quickly deployed and are easily scalable with a development phase of 2-3 years from contract award to commercial operation. This timeframe seems to align well with the timing of the load growth in the area.

Generation can also be scaled over time depending on load growth. Rather than overbuilding wires infrastructure to meet uncertain maximum load growth forecasts, generation can be built in phases such that no forward ratepayer risk is required. This option better aligns with the current IESO priorities of reducing ratepayer risk, as well as the government's priorities of minimizing system costs and making the system more efficient. Here is a helpful visual of how EDFR would view the benefits of scalable, flexible supply versus wires[1]



[1] Unlocking Potential: An Economic Valuation of Energy Storage in Ontario, page 25 illustration 7 - https://energystoragecanada.org/s/nlocking-Potential-An-Economic-Valuation-of-Energy-Storage-in-Ontario-July-2020.pdf

In terms of overall project cost, it is difficult to provide additional data or estimates without more detailed information on the need. Therefore, additional data will allow EDFR and our competitors to provide actual project costs for a right-sized system that would best address the system needs in the area.

Process for Securely Sharing Sensitive Power System Data with Eligible Stakeholders

On slide 17 of the webinar presentation, the IESO states that more analysis is needed for non-wires options (**NWOs**). The IESO correctly points out that more data is required to help characterize the system need to help design NWOs. EDFR supports the need for more data and transparency on system need.

EDFR understands that system data and need analysis can contain sensitive information that the IESO may not want to share with the public broadly. To overcome this obstacle, the IESO could immediately work towards establishing a process to allow stakeholders to be vetted for access to critical system information. Interested stakeholders could be required to undergo a screen to assess eligibility for data access (e.g., market participant, consultant with sector experience, investor, etc.). Other system operators (e.g., NYISO, ISO-NE, and CAISO) have registration processes for access to Critical Energy Infrastructure Information (**CEII**) including system impact studies, power system data and future market studies. The information would be used by stakeholders to design their solutions, verify IESO need conclusions, perform sensitivity analysis among other assessment options. Access to verified and robust data is critical to delivering viable, cost-effective solutions to regional planning needs.

Enhanced System Need Data and Analysis

In terms of data requirements, EDFR agrees with the examples suggested by the IESO in the presentation on slide 17.

As further examples, EDFR believes the following data requests are appropriate starting points for supporting stakeholder engagement:

- **Historical and future load by station or planning area**. The IESO should publish historic hourly station loading for the region to allow stakeholders to understand the characteristics of electricity demand. Publishing station loading may be viewed by the IESO as commercially sensitive information. If that is the case, the IESO should consider establishing planning areas within the regional planning borders. For example, the Alberta Electricity System Operator (**AESO**) has established 6 planning regions and 54 planning areas within those regions. Each planning area includes a small subset of stations. The AESO publishes historical loading for each planning area and provides a demand outlook that interested parties can use in designing and developing projects. The IESO should either publish historic station loading or establish planning areas within the IRRPs to offer insight to interested stakeholders.
- **Constrained Interfaces**. Regional and bulk system needs are often derived from interface constraints. To determine the appropriate solution, an interface assessment is required (e.g.,

how often is it constrained, what is the duration of the constraint, what is the magnitude of the constraint, does the constraint occur under normal operating conditions or abnormal operating conditions, etc.). The IESO should publish information on interface constraints including hourly data for select forecast years to demonstrate the severity of the constraint (e.g., 5 years, 10 years, 20 years outlooks). This information is required for NWOs design and determine if they are viable in resolving the system issue.

- **Calculations of system need**. When the IESO identifies a system, for example the 650 MW potential for energy storage or generation, the IESO should publish the calculation to reach that conclusion. This information will help stakeholders understand the nature of the system need. Further, the calculation can help stakeholders investigate what factors might amplify or diminish the system need. For West of London Bulk Study, the IESO should publish analysis on how they reached the 650 MW value. Further, the IESO should provide an explanation why both the 650 MW and transmission reinforcement is required. In other words, did the IESO consider a larger generation solution that would avoid the need for new transmission?
- **Consistency of regional analysis publication**. Building on the above point, the IESO should establish consistent assessment criteria for a regional power system. The assessment criteria would be based on the various reliability standards and load restoration criteria. For each region or bulk system study, the IESO should publish the results of the assessment criteria, demonstrating to stakeholders what assessments are not an issue and which are. The consistency of a standard analysis publication will help stakeholders understand the nature of power system needs and ensure that proposed solutions are focused on the core issues. The assessment criteria can be an appendix with standard calculations or templates to reduce effort for the IESO and enhance stakeholder understanding of power system planning issues. Calculations should be in a format that is easily downloadable for analysis.

Procurement Mechanism and Compensation Framework

The IESO stated they are seeking to understand the project economics of NWOs. At a high-level, project economic information can be shared with the IESO on typical project costs and attributes. However, the needs of the WOL are unique to the region and require solutions to be designed to viably meet those needs. In addition, to provide the most accurate data and to secure the most cost-effective solution requires commitment from developers to major equipment suppliers as well as development funding to determine the optimal project design and location.

Costs and assumptions for wires solutions are already somewhat known. There is a long-established regulatory framework that ensures cost recovery and term are well known. Similarly, cost estimates per length of line are also fairly easily estimated, and the utilities already have access to much of the data required to estimate what this project would entail. On the contrary, the location, size, output profile and cost recovery mechanism for generation options have not been defined. Without these metrics, it is impossible to do a quality cost comparison to select the optimal resource.

For project developers to provide the IESO with the detailed project cost information needed to determine if NWOs are viable and cost-effective in meeting the system needs, a procurement mechanism and compensation framework for the project is required. A procurement mechanism, such as an RFP, establishes a clear and transparent process for evaluating different NWOs that

stakeholders can leverage to design their projects. The process would also align with what the IESO is already proposing under the Resource Adequacy Engagement.

If the IESO is to compare different NWO to one another on a cost basis, or to compare NWOs to potential wires solutions, the same level of information must be given to all parties. This includes not only the data as outlined above (which presumably is accessible to LDCs and Transmitters) but also the terms of cost recovery. Whereas wires solutions have a clear pathway of cost recovery through the OEB, NWOs do not. Therefore, the IESO also needs to be clear on what procurement design is on the table, for what term, etc. Without such information, it is impossible to compare across resources and secure the lowest possible solution.

With or without a procurement mechanism, the IESO must describe the compensation framework for NWOs providing services to IESO for system needs. A compensation framework is needed for stakeholders to determining financing costs of the project and to engage with major equipment suppliers. For example, if the compensation term is short a stakeholder's negotiation with a major equipment supplier will be different compared to a long-term compensation term since terminal value of the equipment will play a bigger or smaller role in costing under each situation.

Compensation frameworks for NWOs can generally be separated into two groups: a fixed cost payment or a net cost payment. Under a fixed cost payment, the IESO would pay the project a fixed payment to perform the services required for the system need (e.g., inject energy for a specific duration when called upon by the IESO). The fixed payment would not be adjusted if the project received more or less revenue from other sources (e.g., real-time energy). The stakeholder would bear the risk of receiving revenue from other sources. Under a net cost payment, the total payments would be fixed and the amount paid by the IESO would fluctuate based on revenue from other sources. In this situation, the risk of revenue from other sources would be borne by the IESO. A net cost payment would produce a lower price for the IESO, but payments for addressing system need directly from the IESO could vary. Under the fixed cost payment, the IESO payments do not vary regardless of future market conditions.

The IESO could prioritize determining a compensation framework so that stakeholders can have certainty in developing their projects and engaging with major equipment suppliers. However, EDFR would recommend the IESO proceed to an RFP process for clarity on need, competition, and offtake.

Conclusion

At EDFR, we believe the Windsor-Essex and WOL Study forms a unique electricity service territory in Ontario. It has great potential to be the first jurisdiction in Canada to deploy flexible, scalable, grid-scale solar PV and energy storage to serve multiple system needs, both global and regional needs, while saving ratepayers money by avoiding an unnecessary build-out of the transmission system. At the same time, this region could form an example for other regional, targeted deployments of supply and NWOs.

EDFR is again grateful for the opportunity to submit these comments and provide our thoughts on how the Ontario electricity market can evolve to meet the challenges of the future with innovative and emerging technologies such as grid-scale energy storage. We look forward to future discussions and we are available at any time to answer any questions or discuss any clarifications.

Appendix / Additional Comments Section

Coordination Between Services

A resource providing services to the IESO to address regional system needs is also expected to participate in other markets (e.g., IESO real-time energy and ancillary services). The IESO should describe to stakeholders how they expect NWOs to participate in multiple markets and which will be prioritized. In addition, if the reliability services for the transmission system is coordinated by a non-IESO entity (e.g., the transmitter) the IESO should describe how coordination between the two control entities (e.g., the IESO and transmitter) will be accomplished. If NWOs are expected to manage the risk, they should be informed of that. If communication and prioritization protocols are required between different control entities, the IESO should describe the high-level framework they envision for NWOs offer services to meet system needs.

Alignment with Resource Adequacy Engagement

The IESO launched a Resource Adequacy Engagement in the Fall to determine procurement mechanisms to address provincial supply needs. Resources developed for the West of London area will also be able to provide capacity in meeting the provincial needs. The IESO should consider how there will be alignment between the different procurement mechanisms. For example, how should timelines and participation requirements be aligned for the regional need and global needs. Regional benefits must be reflected in the resource adequacy procurement to ensure the IESO optimizes the overall resource procurement. These needs should all be considered when determining revenue streams and term.

NWOs Representation on Technical Working Group

The IESO relies on a Technical Working Group to review and assess options to meet system needs in each region. The current Technical Working Group is composed of Local Distribution Companies (LDCs) and the Transmitter. All the members are regulated utilities that have specific expertise in wires solutions. None of the members have deep NWO expertise or experience in other jurisdictions. This is a significant issue and a missing component in the planning process for identifying and determining the most cost-effective and viable solution to meet power system needs for ratepayers. Further, the Technical Working Group has a natural conflict of interest as they are companies that benefit from wires solutions. Even with the best intentions, their recommendations and proposed solutions are influenced by their expertise and the benefits they would enjoy in supporting wires solutions.

The IESO should convene a second Technical Working Group focused on NWOs that operates in parallel with the existing Technical Working Groups. Joint sessions of the two work groups can be run to define the system needs and share critical system information. The NWO working group can conceptualize appropriate NWOs, help the IESO develop appropriate procurement mechanisms and compensation frameworks. The existing Technical Working Group can work towards developing a "regulated backstop solution" that will meet the system need should a viable, cost-effective NWOs is not available. In short, the Regulated Backstop Solution would set the threshold for NWOs to

overcome to be considered viable and cost-effective. The Regulated Backstop Solution would also ensure that a viable solution is developed regardless of outcomes of the NWOs explored. Finally, the wires-based Regulated Backstop Solution is likely to have a long operating life (i.e., wires solutions tend to have an operating life of 40-50 years), increasing the risk of stranded assets if load growth or system need does not materialize as expected. NWOs compared to Regulated Backstop Solutions can offer the IESO short-term solutions that reduce the forecast uncertainty risk, providing scalability to meeting power system needs.

EDF Renewables Inc.

EDF Renewables Inc. ('**EDFR**') is a world leader in wind, solar and storage renewable electricity systems. EDFR develops, builds and operates renewable power systems in 22 countries by leveraging over $40 billion CAD in short-term liquid financial assets with an interest to invest into the Ontario economy and create jobs.

In Canada, EDFR currently has 1,882 MW of wind and solar assets in operation or construction in Alberta, Quebec and Ontario, and nearly 3,000MW of projects in our development pipeline.

Our most recent commercial operation in Ontario is the 60 MW Romney Wind Energy Centre located in the Windsor-Essex region, specifically in the Municipalities of Chatham-Kent and the Town of Lakeshore. The Romney Wind Energy Centre is a partnership with the Aamjiwnaang First Nation, and it is the only wind project in Ontario that received its Renewable Energy Approval ('REA') that was not appealed to the Environmental Review Tribunal ('ERT'). EDFR is the only LRP contract holder where all Projects received support from the host municipality, project landowners, project neighbours, all with project ownership by Indigenous communities.

EDFR originates, develops, builds, and operates customer-focused energy solutions that incorporate wind, solar, storage, and energy management systems. Our team of developers, engineers, construction managers and O&M, finance and legal professionals work with customers (i.e. utilities, MUSH, corporations, commercial and industrial) to provide wind, solar, storage, EV charging, and storage management solutions that are accessible, affordable and responsive to the electricity consumption profile of the customer. We project manage and deploy our industry experience and affiliate relationships to help our customers navigate and benefit from the complex and ever-changing policy and market dynamics of the renewable energy sector. Our team approach to development and strong balance sheet financing options enable us to bring each project to fruition on time and on budget for our customers.