Feedback Form

Long-Term RFP – February 8, 2022

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Following the February 8th public webinar on the Long-Term RFP, the Independent Electricity System Operator (IESO) is seeking feedback from participants on a variety of elements to help further inform the draft RFP and Contract, including: potential revenue streams, contracting mechanisms, term length and forward period, ability of resources to meet mandatory requirements and rated criteria, as well as the general approach to the RFQ including the proposed method to evaluate finances and experience.

The referenced presentation can be found on the Long-Term RFP webpage.

Please provide feedback by February 18, 2022 to **engagement@ieso.ca**.

Please use subject header: ***Long-Term RFP***. To promote transparency, this feedback will be posted on the Long-Term RFP webpage unless otherwise requested by the sender.

The IESO will work to consider and incorporate comments as appropriate and post responses on the webpage.

Thank you for your contribution.

Revenue Streams

Topic	Feedback
Please provide feedback on the revenue stream options that the IESO proposed. Are there additional revenue streams that proponents see that can be monetized?	Hydrostor welcomes the IESOs forward-thinking on the revenue structures and recognizes that it is difficult to project cash flows post-MRP. Hydrostor recommends that the IESO focus on the contract for difference (CFD) structure that was highlighted. The CFD contract structure provides the most optimal financing structure, which reduces costs to customers, by de-risking revenues required for a long-term asset. Due to the lack of information regarding revenue streams post-market reform, it will be difficult to determine an appropriate collar and financing costs for a collar may be higher as well. In order for the IESO to minimize costs for the ratepayers, a CFD structure would be most cost-effective. The revenue benchmarked against the CFD price should take into account ALL operational revenue streams received by the project including but not limited to: environmental attributes, market revenues, ancillary services, energy arbitrage, power purchase agreements, etc. Hydrostor supports a CFD structured as a revenue-sharing mechanism; a similar structure that has been employed by Ontario, Alberta, and is employed by the New South Wales Government for their long-duration energy storage and generation procurement in Australia. In this recommended structure, if the sum of all operating revenues is under the CFD price then the IESO will pay the operator to make them whole up until the CFD contract price. In the event the sum of revenues is greater than the contract price then the operator will share 50% of the upside above the CFD price with the IESO. The upside will be shared with the IESO only if there were prior time periods where the IESO made the operator whole due to the operating revenue being below the CFD contract price. The proposed revenue-sharing mechanism will lead to lower bid prices as the operators can rely on some upside in the future and thereby minimize costs to Ontario ratepayers. Further allowing generators to see some upside to Market responsiveness will encourage appropriate market behavior and ensure that operators try and maximize revenue during all periods and only rely on the IESO as a backup source of revenue and to ensure the facility can be financed. More information can be found about this structure in the following document from the New South Wales government on pages 25-29. Under any contract structure, 8-hour duration storage should be compensated for the additional value provided to the grid above and beyond the 4-hour minimum currently stated in the mandatory requirements. This could be through an adder for the additional duration that proponents can bid for or the IESO could separate the procurement into two categories, one for a shorter duration and one for a longer duration above 8-hours. This would ensure that projects that are providing longer duration are evaluated fairly for the additional value provided to the electricity grid.

Topic	Feedback
Other jurisdictions have procured new-build resources under long-term agreements through a variety of contract types (power purchase agreements, capacity only contracts, capacity contracts with energy components, etc.). What lessons do stakeholders have from their experience with these other contracting mechanisms?	The biggest lesson Hydrostor has learned from contracting in California, Ontario, and New South Wales is that simpler is always better. Complex contract structures that reward each market product separately can leave an asset stranded due to regulation or market changes. Therefore, it is our recommendation that all revenue streams are included in one single payment ($/kW) as long as the asset is operated to maximize market revenues. The recommended revenue structure noted above which distributes the upside between the IESO and the proponent at 50% each ensures that the operator is continuously maximizing revenue and includes as many revenue streams as possible for the asset. This also limits the operator from curtailing the operations of the project to minimize degradation. In order to reduce CFD prices for Ontario ratepayers and to ensure that assets with longer useful lives are not discouraged, the IESO should allow proponents to bid multiple prices at varying contract terms and energy duration. Assets which can provide longer duration storage and have a longer useful life will be more economic to Ontario ratepayers. This was the process in California and New South Wales: • In California, the procurement for energy storage projects allows the bidder to provide multiple bids at various contract terms. This allows different energy storage technologies to provide varying terms and price options that are all optimized for their specific project. This is critical for ratepayers as it ensures that the selected contacts are optimized for the lowest cost to ratepayers. California RFO can be found here. • In New South Wales, the LTESA tender process allows for tender terms up to 40 years for energy storage projects. LTESA design document can be found here.

Topic	Feedback
What opportunities do stakeholders see in the future to monetize environmental attributes?	Environmental attributes should be passed through to the IESO since the province's clean energy registry is still under development. The IESO can best maximize value to the environmental attributes today as the province continues to work towards net-zero. Further, the IESO should consider the environmental impact of selecting technologies that have a shorter useful life as per the IESO's ESG considerations. Technologies that have a shorter useful life and/or high degradation may have a shorter contract term but will need to be augmented, refurbished or replaced in the medium term. The environmental impacts of those facilities being augmented, refurbished, or replaced should be considered in the IESO's analysis and the full lifecycle costs for each of those technologies should be considered. For example, some long-duration storage technologies have a 30-50 year design lifespan with no degradation and therefore require no augmentation. These technologies have a lower environmental footprint than other commercially available energy storage alternatives, including lithium-ion batteries (given their disposal and resource-input requirements), pumped hydro, and concentrated solar power ("CSP") given land footprint.

Term Length and Forward Period

Topic	Feedback
Please provide feedback on the options for additional term length that the IESO proposed.	A 10-year minimum contract term is not adequate for technologies with longer useful lives. The minimum contract term should be set at 15 years. Any term length shorter than 15 years will discriminate against technologies with longer useful lives and project sizes that can provide additional services to the grid such as longer duration, transmission/distribution grid support, and bulk power management. A longer contract term will lead to lower prices for Ontario ratepayers. Long-duration technologies such as A-CAES have exceptionally long service lives of 50+ years, with appropriate design and maintenance, and A-CAES is not subject to degradation in performance over its life. This significantly distinguishes it from lithium-ion batteries which must account for degradation through overbuilds, augmentation, or replacements increasing costs and lifecycle environmental impacts. A 10-year contract is biased to support shorter duration energy storage and will impede the province from procuring technologies with the lowest cost of storage and greatest benefit to the grid. This will go against the ethos of this procurement as the Minister's directive stated that this procurement must expand competition and ensure affordability for ratepayers.

Topic	Feedback
Do stakeholders feel that the options presented provide proponents with some certainty from an investment and/or financing perspective?	In order for the IESO to receive the lowest CFD bids, the most suitable option is for the IESO is to follow California PUC/CAISO and allow proponents to provide bids for multiple terms as suggested above. This is a hybrid between the second and third options provided by the IESO (an additional term for high-value and bidding in term length). Higher value resources such as those that can provide longer duration will naturally bid at more optimal prices for longer contract terms and therefore be rewarded with a longer-term if selected. Bidders will also be bidding in at term lengths that are best suited for their specific technologies and thereby allow the province to procure a diverse set of technologies best suited towards specific grid applications and most importantly the lowest costs to ratepayers. Longer contract terms allow technologies with longer useful lives to attain better debt and equity financing for the projects. These financing benefits can be passed on to Ontario ratepayers through lower CFD bids and higher reliability on the electricity grid.
What are some options for additional term that the IESO should consider?	

Topic	Feedback
Are stakeholders aware of any resources (new-build and/or expansions to existing resources) that able to come into service as early as 2025? What challenges would resources face with being fully operational by 2025? Please provide any additional information that may help inform the IESO of potential projects and their development timelines, in order to help guide discussions around LT I RFP forward periods.	We as an industry have known about a possible capacity shortfall in Ontario for at-least the last 5 years. Due to the rapid nature of this procurement, we as an industry have not had a chance to adequately prepare for these immediate procurements. As such it would be recommended that the IESO initiate procurement for 2028, 2029, and 2030 immediately to maximize options for the province. These additional options are likely to result in lower costs to Ontario ratepayers due to the additional time provided for planning, development, and construction. For the immediate procurement, it is recommended that the IESO provide additional flexibility (up to 2 years) for the commercial operation date such that larger-scale projects with longer lead times can achieve commercial operation. This will allow technologies that can scale up in size and provide grid reliability to bid for the procurement and ensure the lowest cost to Ontario ratepayers. Further, in addition to the commercial operation date, the IESO should also focus on the viability of the solution such as its ability to provide grid services such as long duration, limited impact to the environment, impact to Ontario's economy through job creation, and overall cost of the solution. Projects with larger size and capital expenditure will naturally take a longer lead time to achieve commercial operation and expediting the requirement of the commercial operation will only bias the technology selection of the procurement. This will again limit the diversity of technology available to Ontarians and go against the ethos of the minister's directive. A-CAES technology requires 4-5 years to achieve commercial operation including 2 years of development and permitting followed by 3 years of construction.

Mandatory Requirements and Rated Criteria

Topic	Feedback
Please provide feedback on the mandatory requirements the IESO proposed.	As stated above the IESO needs to reward projects that provide additional durations. One of the mechanisms as stated above would be to provide an adder for longer duration projects for the additional value they provide. Alternatively, the IESO could also consider making the 8-hour duration a mandatory requirement. This would ensure higher grid reliability for the province especially as new and intermittent renewable energy generation come online later in the decade. As reported by McKinsey: *The rapid integration of large renewable energy capacities with their inherent variability creates large challenges for the power system, including potential imbalances in supply and demand, changes in transmission flow patterns, and the potential for greater system instability as the built-in inertia provided by fossil generation is removed. All these calls for new solutions to create flexibility in electricity supply and demand over different durations — intraday, multiday/multiweek, and seasonal. Long-duration energy storage can provide system flexibility—the ability to absorb and manage fluctuations in demand and supply by storing energy at times of surplus and releasing it when needed. It offers a way of integrating and providing flexibility to the entire energy system, comprising power, heat, hydrogen, and other forms of energy.* Long-duration storage projects with 8 hours or more of storage can be more cost-effective for Ontario ratepayers and have lower environmental impacts depending on the chosen technology. The MIT paper attached here highlights various energy storage technologies and their benefits specifically on page 31. Note that A-CAES does not need to be paired with gas turbines and is emissions-free. Further, the successful energy storage procurement in California is clear evidence that 8-hour duration energy storage is possible today. More information on the procurement can be found here. In addition, it is important to note that Hydrostor supports that not all permitting requirements need to be completed at the time of RFP submission and should be required as part of commercial operation.

Topic	Feedback
The IESO presented a number of technical characteristics that are desirable from a system value perspective, that may form rated criteria in LT I RFP. Please provide feedback on the characteristics proposed and their applicability as rated criteria.	The IESO should publish a specific scorecard for each of the desirability criteria with the highest weight towards long duration as it will have the greatest positive impact on the electricity grid. Additional information regarding the technical characteristics on ramp rate, quick start, and operation range should be requested by the IESO but should not become an evaluated criterion. These factors can vary significantly based on the chosen storage technology. If the requirements are set based on any one specific technology they may unfairly bias that technology while eliminating others that may provide other grid benefits. If these specific technical requirements are considered on an evaluation basis, they must be evaluated together rather than independently. Note that Hydrostor's A-CAES solution provides significant flexibility with respect to ramp rate, quick start, and operational range with performance similar to or better than other rotating power generation equipment such as natural gas-fired facilities. Further, the project size should be capped at no less than 500 MW. For technologies that provide a longer duration of 8 hours or more, and larger capital expenditure the lowest cost is achieved at project sizes of 500 MW+. This will lead to lower CFD prices for Ontario ratepayers since projects will longer useful lives and economics of scale can be considered. A comparison of varying energy storage technologies, their grid functions, and how they scale can be found here. Lastly, the IESO should consider the value of grid inertia, and its importance to system stability and reliability as the power system transitions from synchronous traditional generation to largely asynchronous renewable technologies such as wind, solar, and batteries. A-CAES provides long-duration, emission-free energy storage that can be flexibly sited where the grid requires it. It does so with large-scale rotating generators that deliver traditional grid stability services sought by utilities such as reliable (long-duration) capacity, spinning reserves, voltage support, and synchronous inertia.

RFQ

Topic	Feedback
Do stakeholders feel that the high level approach proposed for the RFQ satisfies the IESO's goal of ensuring that interested parties have the capability to undertake project development for the LT I RFP, while also enabling competition?	Hydrostor recommends that the IESO separates the RFP into two categories: long-duration over 8 hours and short duration under 8 hours. The distribution should be split at 600 MW for a long duration and 400 MW for a short duration. The benefits of this approach will be: • the IESO can contract both short-duration and long-duration energy storage to meet the reliability and procurement needs of the province • longer duration projects can bid for longer contract terms and evaluated fairly based on the additional value provided to the grid • long duration projects can be provided a longer lead time for construction and thereby provide lower costs to Ontario ratepayers

General Comments/Feedback

Hydrostor appreciates that the IESO is openly receiving and evaluating feedback for the LT1 RFP process. In order to achieve the stated goals of the IESO in reducing ratepayer costs, and increasing the reliability of the grid the IESO should consider the following key changes as discussed above:

- Using a simple CFD contract structure that shares possible upside with the proponent to minimize CFD bids, maximize operational revenue, and most importantly reduce costs for Ontario ratepayers
- the CFD contract structure should provide additional value for long-duration storage technologies which provide higher benefit to the electricity grid
- the minimum contract term should be increased to 15-years to ensure that the procurement is not biased against technologies with longer useful lives
    - the tender process should also allow proponents to bid multiple term lengths and prices to minimize costs to ratepayers as is the case in California and New South Wales
- the IESO should provide flexibility on commercial operation dates to ensure that projects that require longer lead times can be included in the process if they provide lower contract prices
- the IESO should also consider breaking apart the procurement into long-duration and short-duration energy storage in order to ensure that technologies that can provide longer duration can receive a contract that reflects the value provided to the grid and the revenue certainty required for investment