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New York Independent System Operator
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H.Q. Energy Services (U.S.) Inc., a U.S. subsidiary of Hydro-Québec "HQ", hereby offers proposals for transmission needs and associated evaluation criteria in response to the Notice of Request for Proposed Transmission Needs Being Driven by Public Policy Requirements for the 2020-2021 Transmission Planning Cycle issued by the NYISO on August 3, 2020.

Introduction

HQ is the largest clean energy supply company in North America, with extensive experience in the generation, transmission and delivery of clean energy both in Quebec and in its export markets in eastern Canada and the United States. HQ supplies this energy using a generation portfolio almost entirely comprised of renewable energy (largely reservoir hydropower). The company has installed hydropower capacity of over 37,000 MW, and in 2019 99.6% of the energy flowing on its grid was from low-carbon sources.[1] HQ's generation fleet includes resources from a buildout initiated in 2003 to bring online over 5,000 MW (approximately 24 TWh of generation) of new hydropower capacity, which is now available to commit to providing clean energy solutions in markets outside of Quebec.

In addition to having a greenhouse gas emission profile similar to wind and solar[2](and with no emission of local air pollutants that contribute to smog and acid rain), reservoir hydropower from Quebec is also controllable, and able to be dispatched at the volume necessary to meet energy needs on an intra-hourly basis (HQ has the capacity to generate between 10,000 and over 42,000 MW per hour and can ramp up or down by 5,000 MW each hour). Clean resources that can provide this level of flexible capacity (traditionally provided by fossil fuel resources such as natural gas generation in New York) will become increasingly valuable as New York progresses towards the goal of 100% decarbonization of its electricity sector by 2040, as mandated in the Climate Leadership and Community Protection Act ("CLCPA").

The dispatchable characteristics of HQ's hydropower fleet combined with 176 TWh of storage capability from the associated vast interconnected reservoirs allows the HQ system to replicate the features of a massive battery, allowing this system to absorb excess renewable generation from neighboring regions and store this energy to be used in future periods when it's needed to reinforce low renewable generation and/or high demand. Unlike conventional battery storage technologies, the HQ system is able to store energy for future use across multiple hours, days and even seasons.

The combination of these features (large volumes of competitively priced clean energy, flexible characteristics, and long-duration storage capability) and HQ's geographic proximity to New York presents a unique opportunity for New York to attain the ambitious clean energy goals codified in the CLCPA. This can be achieved through HQ delivering additional volumes of clean energy to New York,

[1] Hydro-Québec 2019 Sustainability Report, Page 68
[2] http://ciraig.org/index.php/lca-study/comparing-power-generation-options-and-electricity-mixes/

providing the flexible operating characteristics necessary to reliably integrate higher penetrations of renewable energy into the New York grid, and allowing New York to utilize the HQ system to act as a battery in order to achieve levels of deeper decarbonization more efficiently and at a lower cost to New York ratepayers. However, HQ providing any, and all, of these services can better be achieved through additional transmission capability developed between Quebec and New York.

Therefore, HQ is recommending that the following transmission needs being driven by the Public Policy Requirement be identified in order to meet the goals and objectives of the CLCPA as affordably and expeditiously as possible:

1. *A Public Policy need should be identified for transmission projects to deliver more renewable and clean energy to New York City*

2. *A Public Policy need should be identified for transmission projects that deliver flexible renewable generation and enable long-duration storage capability to Upstate New York*

Achieving the objectives in the CLCPA (namely that 70% of New York's energy is sourced from renewable energy by 2030 and 100% decarbonization of New York's electricity sector by 2040) is ambitious, but achievable. In addition to meeting these goals, New York should also work to ensure that (1) the underlying reliability and affordability of New York's electricity system is preserved, (2) disadvantaged communities share in the benefits of clean energy programs and are not disproportionately burdened, (3) all eligible clean resources available to New York are fully considered as part of a comprehensive portfolio of solutions, and (4) where possible, solutions should be prioritized that can meet both the current and future needs of the State's rapidly changing electricity system.

It should also be noted that the Public Policy Transmission Planning Process has become a more important tool in meeting New York's clean energy goals with the implementation of the Accelerated Renewable Energy Growth and Community Benefit Act ("ARA"), which mandates the creation of a bulk transmission system investment program that identifies the transmission investments necessary or appropriate to achieve the CLCPA targets, and which will utilize the Public Policy Transmission Planning Process to select projects necessary for implementation.

New York's Public Policy Transmission Planning process and the ARA are critical components of both planning for and providing a path forward for the investment in transmission infrastructure necessary to unlock the full potential for HQ to help in providing the most optimal solutions to New York's clean energy needs.

1. A Public Policy need should be identified to deliver more renewable and clean energy to New York City

The successful development of new transmission that is capable of delivering clean and renewable energy directly into load centers in Downstate New York will be a key element of success in achieving New York's clean and renewable energy goals, and environmental justice provisions in the CLCPA.

Downstate load centers in New York, including New York City, have historically been characterized by a high reliance on fossil fuel generation to meet their energy needs, which is expected to intensify as the Indian Point nuclear facility fully retires next year. This reliance on fossil fuel energy is due largely to the difficulty in developing large volumes of economically competitive renewable energy in and around New

York City, and persistent transmission congestion that prevents excess clean energy from Upstate New York from being delivered to Downstate load centers. While New York State is taking action to address both of these barriers (through nation-leading offshore wind procurements and transmission upgrades designed to relieve system congestion), the scale of clean energy needed to decarbonize New York City will require a comprehensive approach that includes all viable solutions, including new transmission. This is all the more true insofar as New York City is looking to decarbonize other sectors of its economy through electrification using clean energy.

New transmission developed between Quebec and New York City represents an opportunity to provide up to 30% of New York's remaining clean energy needs (as identified in the CES Whitepaper[3]) with a single project. This type of project would put in place infrastructure that can adapt to meet New York City's energy needs, which will change over time as the region decarbonizes.

- In the near-term the line would provide a source of clean and affordable baseload supply to replace aging and retiring generation downstate and deliver immediate benefits in reducing CO2; while also reducing other harmful air pollutants (nitrogen oxides, sulfur dioxide and particulate matter) which are released from local fossil fuel powered plants.
- In the medium term, the line can be used along with HQ's dispatchable characteristics and operating flexibility to balance and firm higher penetrations of local wind and solar as these resources achieve higher scale.
- And in the long-term, new transmission between Quebec and New York City will enable two way trading of electricity, and enable HQ to act as a battery to absorb excess renewable generation in Downstate New York, to be stored and redelivered back to New York City in higher demand periods.

All of these services provide significant benefits to both New York City and the State, including considerable cost savings as the region moves towards deeper decarbonization and the achievement of New York's CLCPA goals. Note that while HQ envisions the needs in New York changing over time in the sequence presented here, additional access to the HQ system through new and expanded transmission offers the option and ability for HQ to provide the services necessary to respond to customer needs as they actually occur.

The need, and ability for new transmission to deliver renewable energy to Downstate load centers in New York is well documented, with various solutions and approaches being proposed. Therefore, any evaluation of competing transmission solutions should be appropriately designed to acknowledge and weigh the value any new project provides to the State, reflecting both the costs and the benefits of proposed projects, including considerations for:

- Project in-service date (preference for projects which can come online and begin delivering renewable energy sooner)
- Project viability
- Ability for the project to be fully sourced with incremental clean/renewable energy delivered to New York City

[3] HQ deliveries over a 1,000 MW HVDC transmission line at 90% capacity factor could deliver approximately 8.3 TWh per year, or over 30% of the 24.9 TWh of remaining renewable energy estimated to be needed to meet the 70% by 2030 target in the White Paper on Clean Energy Standard Procurements to Implement New York's Climate Leadership and Community Protection Act (Case 15-E-0302), June 2018, page 23

- Expected contribution towards NY's CLCPA objectives
- Fuel diversity benefits
- Ability for the project to provide capacity (and other reliability and resiliency benefits)
- Ability for the project to provide operational flexibility
- Legacy benefits provided to New York

Based on the proposed evaluation criteria above, a key element in considering the value of any new transmission project should be whether the project can access additional sources of clean and renewable energy made deliverable to NYC, and the operating characteristics of this new supply. This should include supply from any technology defined as renewable in the CLCPA, including hydroelectric generating systems.

As mentioned earlier in the context of the Public Policy Transmission processes and the ARA, compatibility and ability to capture synergies across State programs will be important in achieving New York's goals in the most efficient and effective manner possible. Therefore, any Public Policy Need should also be considered within the context of regulatory actions that may be adopted in the near-term, such as the Tier 4 program proposed in the Clean Energy Standard White Paper, designed to deliver renewable energy to New York City. In this way, a Tier 4 contract paired with a Public Policy Transmission project could work jointly to ensure that the benefits of any new transmission project are fully captured, by ensuring that the renewable energy products that provide the most value to the State and City are delivered over the line. For example, a transmission project between Quebec and New York City could enable an energy contract which requires HQ to fill the new transmission line and deliver renewable energy and associated attributes, each hour of every day, throughout the term of the contract – maximizing clean energy benefits to the State and minimizing the transmission cost on the basis of delivered energy.

While the sole existence of a new transmission line between Quebec and New York City would indisputably result in considerable volumes of additional renewable energy being delivered to New York City, an associated energy supply contract (through the proposed Tier 4 program or other action) would guarantee that deliveries occur at a volume and over a timeframe conforming to New York goals in the CLCPA, which extend through to 2050.[4] An appropriately designed contract would also help address regulatory risks and remove barriers that may prevent renewable energy flows over the line, such as the NYISO's Carbon Pricing Proposal, which as proposed creates additional costs and risks to external clean suppliers seeking to deliver energy into New York.[5]

2. A Public Policy need should be identified for transmission projects that deliver flexible renewable generation and enable long-duration storage capability to Upstate New York

In order to meet the objectives of the CLCPA, in particular the goal of 100% decarbonization of the electricity sector by 2040, New York will need greater access to flexible and long-duration storage capacity from non-fossil fuel generation. The more immediate need for these services is in Upstate New York, which is already beginning to face challenges associated with integrating higher penetrations of

[4] The CLCPA goals include an objective for 85% reduction in statewide GHG emissions by 2050, and net zero emissions in all sectors of the economy

[5] See HQUS's public comments on carbon pricing for additional details, notably (i) June 20, 2018, *HQUS Comments on Draft Straw Proposal*, (ii) November 15, 2018, *HQUS and Brookfield Renewable Comments on Carbon Pricing Proposal*, and (iii) November 18, 2019, *HQUS Comments on Analysis Group Report.*

intermittent renewables into the system. One of the most viable solutions to address this challenge is to increase transmission capacity between Quebec and Upstate New York, which will improve HQ's ability to provide flexible deliveries and to act as a battery, allowing New York to more efficiently integrate higher penetrations of renewable generation into the State grid and achieve renewable energy and decarbonization goals faster and more cost effectively.

HQ can provide this service by importing energy from New York into Quebec during periods with high in-state renewable production and low demand. This allows in-state renewable production that would otherwise be curtailed or exported to be stored in HQ's reservoir storage system (in the form of water) and made available for future periods, where it can be used to meet demand and fully contribute to New York's renewable energy goals (in particular the 70% renewable by 2030 objective).

The need for and value of these types of storage services is already present in Upstate New York, as detailed in the NYISO's most recent CARIS report, which states that approximately 10% of New York's generation could be curtailed on annual basis in the absence of necessary mitigation measures. The risk of curtailment is especially prevalent in the North Country, where a generation pocket shows as much as 63% of potential wind curtailment.[6] These curtailments are largely due to the shape of the intermittent (inflexible) generation profile and the lack of sufficient bulk and local transmission capacity to deliver excess renewable generation located in major generation pockets in New York, which are expected to increase as New York acts to integrate more renewable energy into the Upstate system. As stated in the CES White Paper, statewide Tier 1 procurements will need to average almost 4,500 GWh annually over 2021 to 2026 in order to meet the 2030 target.[7]

The HQ system is well positioned to help reduce curtailments of new and existing clean generation resources in New York by providing affordable storage solutions at large-scale volumes. However, HQ is currently limited to the size of existing interconnections to provide these services, which will quickly become inadequate to accommodate the renewable additions expected to occur in the Upstate region. Therefore, new transmission between Quebec and New York represents a cost effective approach to help facilitate New York's renewable energy ambitions.

According to a recent study by MIT:[8]

> Across deep decarbonization scenarios, new transmission between Northeastern states and Quebec increases both imports from and exports to Quebec, allowing trading to further complement intermittent renewables. If we employ an analogy of Quebec's reservoirs as a battery for Northeastern power systems, more transmission to Quebec electively increases the rate at which this battery can be charged and discharged. The role of Quebec hydro as a storage

[6] *See* Jason Frasier, Manager of Economic Planning, Management Committee at NYISO, *2019 CARIS Phase 1 Report* (Jul. 1, 2020) at 34, available at https://www.nyiso.com/documents/20142/13410189/02%202019_CARIS_MC_Presentation.pdf/0cc74566-61b1-65f0-0e3c-4a819f1886b8 ("CARIS Summary").

[7] White Paper on Clean Energy Standard Procurements to Implement New York's Climate Leadership and Community Protection Act (Case 15-E-0302), June 2018, page 26

[8] Emil Dimanchev, Joshua Hodge & John Parsons, MIT Center for Energy and Environmental Policy Research, *Two-Way Trade in Green Electrons: Deep Decarbonization of the Northeastern U.S. and the Role of Canadian Hydropower* (Feb. 2020) at 54, available at http://ceepr.mit.edu/files/papers/2020-003.pdf.

resource suggests that building additional transmission is a complement to deploying clean energy in the Northeast, rather than a substitute.

The MIT study estimates that HQ performing this role with increased transmission availability can reduce the cost of power system decarbonization by up to 5-6%, by utilizing existing hydropower resources as a balancing resource to facilitate greater and more efficient use of wind and solar resources in New York.[9]

The need for additional storage resources Upstate is relevant for New York beyond the 70% by 2030 goal, as the CLCPA also requires that New York's electricity system be fully decarbonized by 2040. This means that New York will have to take more aggressive near-term action and depend largely on existing technologies to achieve this goal – which will grow more difficult as New York acts to decarbonize other sectors of its economy (such as heating and transportation). Electrification of the heating sector in New York will result in a significant increase in electricity demand in the winter, creating a dual or winter peaking system.[10] This will require New York to have access to dispatchable and long-duration storage capacity to ensure adequate electricity supply during periods of high heating loads and low renewable production which can occur over several days.[11]

While it is likely that New York will build upon recent efforts to relieve transmission constraints in Northern and Upstate New York to better enable new and existing clean energy greater access to Downstate load centers, expanding transmission between Quebec and Upstate New York will remain necessary in order to accommodate the scale of renewable generation envisioned in the White Paper. Both actions will also be complementary, as increased transmission capacity to Quebec will allow HQ to deliver more renewable energy into New York during peak periods, mitigating price spikes and reducing the need for New York to rely on fossil fuels, or invest in more expensive clean peaking capacity.

HQ's proposed evaluation criteria to compare project solutions would be similar to the methodology detailed in the first proposal, where projects are assessed based on their value, and ability to achieve New York's clean energy goals as defined in the CLCPA.

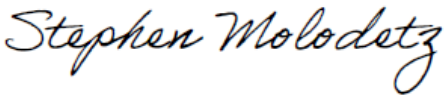
Expanded transmission between Quebec and New York should also be paired with wholesale market enhancements envisioned by the NYISO to compensate resources for providing the energy characteristics required to achieve New York's transformation to a decarbonized electricity system (including the storage characteristics described above). Because such market enhancements will likely take years to develop and implement, more immediate action to develop transmission which can deliver these products, and which will also take years to commission, will allow for more timely and integrated solutions. A thorough review of existing and proposed regulatory barriers should also be conducted, such as provisions of the NYISO Carbon Pricing proposal which, under its current form, fails to optimize the contribution of clean external resources towards achieving New York's clean energy objectives.

In conclusion, HQ appreciates the opportunity to comment and provide proposals for transmission needs being driven by Public Policy Requirements. Transmission investment represents a critical element to the achievement of New York's goals, and pursuing transmission investments that can

[9] MIT Study at 1.
[10] London Economics International LLC, *New York State future outlook to 2050* (Aug. 27, 2020), page 17 and 23-24.
[11] *See* Energy+Environmental Economics, *New York State Decarbonization Pathways Analysis Summary of Draft Findings* (June 24, 2020) at 21.

deliver the energy solutions capable of addressing both the current and future needs of New York's energy system will provide the best value for ratepayers.

Respectfully submitted,



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