2021

IN THE MATTER OF THE YUKON ENERGY CORPORATION APPLICATION FOR AN ENERGY PROJECT CERTIFICATE AND ENERGY OPERATION CERTIFICATE FOR THE PROPOSED BATTERY ENERGY STORAGE SYSTEM PROJECT

YUKON CONSERVATION SOCIETY

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Yukon Conservation Society

The Yukon Conservation Society (YCS) is a grassroots environmental non-profit organization, established in 1968. Through a broad program of conservation education, input into public policy, and participating in project review processes, we strive to ensure that the Yukon's natural resources are managed wisely, and that development is informed by environmental considerations.

Introduction

During the proceeding and as mentioned in the application it was noted that the only suitable alternative to the Battery Energy Storage System (BESS) project would be rented diesel generators. It is the opinion of YCS that this is not a suitable alternative. Yukon Government (YG) will soon mandate that greenhouse gas (GHG) emissions must be reduced by 45% below 2010 levels in 2030, over and above the targets outlined in 'Our Clean Future' (Yukon Government, 2020).

The Federal Government has outlined a net-zero emission future, this would require the proliferation of electrification of heating and transport (Government of Canada , 2021). Therefore, it is critical to augment the Yukon Integrated System (YIS) to integrate additional renewable electricity generators to provide customers with low GHG emission electricity, while working to reach the goals outlined by the federal and territorial government. To achieve this target installing more diesel generator capacity would not be prudent. The BESS would strengthen the YIS ability to integrate more variable renewable energy generators namely from wind and photovoltaics. The proponent has stated that the BESS project would provide 7.2MW of dependable capacity therefore directly displacing 4X1.8 MW rented diesel units (Yukon Energy Corporation, 2021) on the YIS. Therefore, directly eliminating emissions and fuel supply issues directly attributed to these diesel gensets.

Foreword

Please note the following contractions used in the report, Yukon Utilities Board as the Utility Board, Yukon Energy Corporation as YEC, Hatch Consulting Engineering as Hatch, Atco Electric Yukon as AEY, Alberta Utility Board as AUB and Battery Energy Storage System (the project) as BESS. Issues not discussed in the following report are not to be interpreted as endorsements or oppositions to the issues presented to the Utility Board regarding the BESS project.

Emissions Reductions

As outlined in the Golder Report, direct emissions reductions from the BESS are estimated at 606,736 tCO_2 eq (Golder Associates Ltd. , 2019) based on the grid configuration estimates from 2019-2043 or over the life of the project. As more renewable energy is integrated into the system the total emissions reductions could be increased.

In addition to CO_2 eq emissions reductions, emissions of microscopic particulates, products of diesel combustion, are also expected to be reduced as diesel generation is displaced by the BESS. Other noxious gasses including Nitrogen Oxides (NOx) and Sulphur Oxides (SOx), which directly impact the health of the local environment are similarly expected to decline. The combustion from diesel-engines are known to severely impact human health, as such Paris has banned diesel vehicles from their city by 2024

(Mulder, 2020), it would be prudent for the YEC to seek all alternatives to diesel combustion and this project does that. '*The Project will also have positive environmental and socio-economic effects. Notably, the Project is expected to provide for reduced greenhouse gas and particulate emissions resulting from the displacement of thermal generation emissions, reduced impacts from YIS disruptions, and enhanced ability to integrate new renewable generation.'* (Yukon Energy Corporation, 2021)

Local Fuel Source

Energy independence is an important issue to Yukoner's, this project would decrease the amount of diesel fuel that would need to be transported into the Territory. Decreasing the total amount of fuel in transportation to the Territory would also lower the probability of a fuel spill incident in transit.

The fuel source, charging source for the BESS is located within the Territory and is supplied by local generators. Comparison of fuel sources can be simply stated as hydro versus diesel. It is noted that the YIS has other generators that would lead to the fuel for the BESS, but the majority would come from hydro. The hydro resource is an abundant, local fuel source. Greater energy security within the Territory would lead to less reliance on imported fossil fuels and insulate YEC and its customers from the volatile pricing of fossil fuels.

The BESS will allow for hydro efficiency gains, estimated at 0.5-1%, and this would equate to an increase in generation of 2.2-4.4GWh annually from the same volume of water (Yukon Energy Corporation, 2021). This increased efficiency from hydro generation should lead to a reduction in thermal generation on the YIS.

Additional benefits include operating reserve for the YIS, the BESS can provide this by being integrated to the grid and having a moderate to high state-of-charge, thus acting as a backup generator (Yukon Energy Corporation, 2021).

Skepticism about if a grid-scale battery system operating in a northern area is to be expected. However, the Hatch Feasibility study notes the following locations of Lithium-Ion Battery (LIB) projects in operation, '*Raglan Mine (Nunavik, Northern Quebec), completed in 2015; and Colville Lake completed by Northwest Territories Power Corporation in 2016.*' (Hatch Consulting Engineering, 2020). The Hatch report notes that LIBs are the most established energy storage technology outside of pumped hydro (Hatch Consulting Engineering, 2020).

Renewable Energy Integration

The project anticipates that a benefit of this project is in the ability to integrate variable renewable energy into the YIS, such as wind and photovoltaic. The YEC 10-year renewable energy plan, expects that YEC will continue to integrate additional variable renewable energy into the YIS from Independent Power Producers (IPP), utilising the Standing Offer Program (SOP). YCS is of the opinion that the BESS is a valuable additional to the YIS that will enable further deployment of varying sizes and types of distributed generation on the YIS.

Based on information from the project application there was a 25 MW N-1 shortfall in 2021 and a projected shortfall 40MW by 2030. The application attributes this shortfall to a projected increase in population, more EV's, an increase to home heating through electricity and the potential for industrial sites to be grid connected. Highlighted in the 10-year renewable energy plan, this shortfall is to be made

up through renewable energy integration and as mentioned in the project application, having a grid scale battery will facilitate the integration of variable renewable energy generators.

Resilience to Climate Change

A priority in 'Our Clean Future' is that infrastructure; including electrical infrastructure needs to be more resilient to the impacts of climate change. The BESS project advances this priority in two ways.

The battery project allows the YIS to be more resilient to climate change. As noted in the project application, by preventing ice build-up down stream of the Whitehorse rapids facility during winter operations. The BESS would add robustness to the system in cold winters when there is more of a risk of ice build-up downstream of the generating facility.

Some climate change models anticipate more intense precipitation events. As stated in the application, during such events the water resource would need to be spilled and therefore not utilized for generation. The BESS allows for energy storage, and less hydro resource 'waste' should high intensity precipitation events occur more frequently in the future.

Modularity

Grid scale batteries have significantly decreased in price over the last decade and reports indicate that they will continue to do so in the near future (Henze, 2020). Responses to (IRs) indicated that the technology is evolving and that when more capacity is added to the BESS, it will be done so in a manner that protects the infrastructure in place and augments the overall capacity of the system. A modular system, as noted in the Hatch report is a key to readily integrating further batteries in the future as the electricity needs of the Yukon Territory changes.

Material Sourcing

YCS is of the opinion that the procurement process and material should be socially and environmentally ethical. It was noted in response to IR-YSC-YEC-2 that this process would be examined when selecting vendors. While this could have cost implications for the grid scale batteries (Vasil, 2020). Ethical sourcing of material for the grid scale battery energy storage system will be important to Yukon residents and this information should be made available to the public before the vendor is selected.

End of Life

YCS is concerned about what happens to the BESS at the end of the project; this issue has been addressed by the proponent in IR-YSC-YEC-3. It notes that recycling LIBs is a developing field and that advancements in such techniques should be anticipated by the end of the project life. It further notes in the project application that the supplier is to be responsible for removal and disposal of the batteries at the end of life. It is the opinion of YSC that the recycling and disposal process should be discussed and have public input. Below is and excerpt from the Hatch Report:

> *'The battery modules and cells should be recycled if refurbishment is not possible. There are currently three processes for recycling lithium ion batteries, involving smelting, incineration, and cryogenic freezing and shredding.'* (Hatch Consulting Engineering, 2020)

Benefit to Rate Payers

The project has benefits from a technical standpoint as highlighted in the project application. The benefit to ratepayers is a positive to the project as well, when compared to renting diesel generators. In IR-JM-YEC-1-33 Table 1, it mentions that the savings to ratepayers as compared to rented diesel generators. This forecast is conservative in its nature as it does not include volatility in diesel fuel prices in the future. This table also does not include, the potential of a carbon tax being applied to northern jurisdiction electricity providers. Should the federal carbon tax be implemented, it would prove even further savings to the ratepayer in the future.

Conclusion

The BESS project which is comprised of 40MWh of battery storage on the current grid configuration would allow for firm capacity of 7.2MW (Hatch Consulting Engineering, 2020). This will directly lead to the elimination of 4x1.8MW rented diesel generators. This is a prudent course of action from the YEC to make the YIS more capable of delivering lower GHG emission electricity to its customers. YCS believes that this is an important project, if it operates as stated in the application, that it will limit the amount of fossil fuel used and integrate more variable renewable energy to the grid.

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