

NOVA SCOTIA ENERGY BOARD

Factorydale Hydropower Plant Refurbishment

Capital Work Order Application



Berwick Electric Commission

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INTRODUCTION

1. The Factorydale Hydropower Plant (“Factorydale”) is a reservoir-based hydroelectric system managed by the Berwick Electric Commission (“BEC”) that has been in operation since 1922. Factorydale utilizes water from the south branch of the Annapolis River to generate electricity.
2. In 2023, an incident occurred at the Factorydale site that resulted in the complete shutdown of the water turbine and consequently, a complete loss of power generation. BEC retained Hysovent Sustainable Engineering (“Hysovent”) to conduct a Root Cause Analysis to determine why the turbine failed. Hysovent concluded that an object large enough to break gates passed through and broke one or more wicket gates, creating a catastrophic event in the turbine leading to irreversible damage to the complete turbine, necessitating a replacement of the unit.
3. In light of the damage to Factorydale, Hysovent conducted a comprehensive condition assessment and costed option analysis for BEC (“Condition Assessment”), which is attached as Appendix A. Hysovent concluded that the plant’s overall health is compromised by aging infrastructure and the significant damage to critical components, particularly the turbine. Three costed options to address the situation were analyzed: (1) like-for-like replacement of the damaged turbine, (2) installation of a new, modern unit, and (3) full decommissioning of Factorydale. Based on the analysis, Hysovent determined that the installation of a new unit presents the most attractive option for BEC and its customers.
4. As a complement to the Condition Assessment, Hysovent conducted a further study of different scenarios of water flow through Factorydale for the like-for-like replacement and new unit scenarios using quotes from manufacturers, which is provided as Appendix B. Hysovent found that the results were in line with the results obtained in the first iteration of the analysis, reinforcing and making a stronger case for a new unit at Factorydale.
5. In March 2025, Hysovent prepared a Feasibility Study for the Factorydale Refurbishment Project (“Feasibility Study”), which is provided as Appendix C. The scope of the study includes the supply, installation, and commissioning of a new Francis-type hydro turbine

optimized for the plant's existing hydraulic conditions, as well as necessary upgrades to the generator, new trash rack in penstock entry, control and automation systems, monitoring and protection systems, governor, switchgear, excitation system, power transformer and all associated mechanical and electrical infrastructure. The Feasibility Study provides a comprehensive summary of the technical and financial feasibility of the refurbishment project, which is designed to upgrade existing equipment and infrastructure to increase its capacity from 416 kW to a range between 650 kW and 750 kW, enhancing efficiency, reliability, and long-term sustainability.

6. The refurbishment project is currently in the Request-for-Proposal ("RFP") process stage, with final internal spending approvals contingent on contractor selection and refined cost estimates. At page 38 of the Feasibility Study, Hysovent notes that it estimates the total project costs will be in the \$6,000,000 range, and this remains BEC's working estimate at this time. Accordingly, BEC seeks approval of this Capital Work Order Application for capital costs of \$6,000,000, which includes any grant funding that may be received pursuant to the Green Municipal Fund. Consistent with the Board's practice, only the actual incurred final project cost, net of received grant funding, would be included in calculating BEC's revenue requirement.

PROJECT LOCATION AND COSTS

7. Factorydale is located at 2545 Harmony Road, Aylesford, Nova Scotia. The site conditions, current equipment, and proposed equipment are described in detail in Section 2 of the Feasibility Study.
8. As noted above, the project costs are expected to be approximately \$6,000,000. This cost estimate was developed using a multi-step approach to maintain a +/- 20% accuracy. First, BEC's consultant, Hysovent, performed the Condition Assessment to identify the specific refurbishment needs. Next, preliminary designs were derived in collaboration with original equipment manufacturers, who provided high-level quotes for major components such as the new turbine, generator, and balance-of-plant systems. Finally, BEC and Hysovent cross-checked the figures against historical cost data, validating that the \$6 million is appropriately conservative. The breakdown of the project costs into various components at this time is as follows:

Item	Estimated Cost in CAD (excluding Tax)
Installation and Commissioning	\$1,280,155
New Turbine - 650 kW	\$1,039,000
650kW Generator, 600 RPM	\$461,430
Hydraulic Power Unit, Servos and Field Piping	\$115,700
Controls Protection, Switchgear and related commissioning	\$820,560
New Transformer	\$120,000
New Log Boom	\$120,000
New Trash rack	\$150,000
New Intake Gate	\$125,000
Transformer commissioning	\$15,000
Decommissioning	\$125,000
Spares (5.5% of the total costs of electromechanical equipment, estimate, we will know once final design is completed)	\$135,116
Contingency (20% of total electromechanical equipment cost, to cope with unforeseen and unknown situations during commissioning)	\$980,392
Interest during construction - 4% annual - to cope with price increases of raw materials and equipment during project execution	\$117,647
Full application for GMF funding	\$5,000
Financial Audit	\$20,000
Environmental Results Report	\$20,000
Engineering Consulting and on-site supervision	\$300,000
Estimated Payroll costs - Staff Remuneration	\$50,000

9. The confidential RFP process for the project is currently underway, with final internal spending approvals contingent on contractor selection and refined cost estimates. In order to guarantee the best pricing from proponents and a higher level of specialization on the proposals, BEC and Hysovent split the project in four separate RFPs for (1) the main electromechanical contract, (2) demobilization, (3) transformer upgrade, and (4) trash

rack. The RFPs have all been released and proposals have been received, with BEC in the process of notifying and working with the successful proponents.

PROJECT JUSTIFICATION

10. In terms of the available options, full decommissioning of Factorydale is not seen as a viable alternative. As noted at pages 113-114 of the Condition Assessment, decommissioning each dam on the system is estimated to cost roughly \$4.7 million, for a total of \$18.8 million if all the dams and the powerhouse need to be decommissioned. There are no federal or municipal funding programs for this kind of endeavour, and the project would take years to complete, especially due to the significant environmental studies and planning required. For a fraction of this cost, BEC can take steps so that it can continue to operate upgrade Factorydale for the benefit of its customers for decades to come.
11. In support of the Capital Work Order Application for a new unit (as opposed to a like-for-like replacement of the turbine), BEC relies on the detailed and conservative Costed Option and Financial Analysis prepared by Hysovent and included in Appendices 1, 2, and 3. In particular, the simple like-for-like turbine replacement option is not eligible for any grant funding because BEC is not increasing the renewable energy capacity of the plant. In contrast, the proposed refurbishment project presents the opportunity to fully replace the entire existing electromechanical assets, including the generator, switchgear, and governor system. This will significantly increase renewable energy production to help meet the Province's requirements for 80% renewable electricity and greatly improve reliability.
12. BEC is required to meet increasingly stringent legislative requirements with respect to the generation of renewable energy. Section 6B(1) of the *Renewable Electricity Regulations* requires that beginning in the calendar year 2030, BEC must supply its customers with renewable electricity in an amount equal or greater to 80% of the total amount of electricity supplied to its customers. Upgrading Factorydale decreases BEC's reliance on electricity purchases from NS Power that are subject to volatility and pricing increases as NS Power also proceeds toward the closure of its coal plants and the transformation of its electricity grid. As a 100% renewable source, it also provides an opportunity for BEC to purchase

non-renewable economic alternatives should they materialize, while remaining compliant with the overall 80% requirement. Additionally, having the electricity delivered to all utility customers, ensures this renewable electricity is accessible to everyone, with benefits for all of BEC customers.

13. Upgrading the turbine and generator systems will increase energy efficiency, reducing operational costs. By extending the plant's operational life by 50 years, the project aims to minimize long-term capital expenditures compared to constructing new facilities. Modern controls, SCADA integration, and advanced protection systems will enhance operational reliability, reducing the risk of outages. Real-time monitoring will enable proactive maintenance, ensuring uninterrupted energy delivery and improved grid stability. Substation upgrades provide resiliency and capacity for redirecting load, further increasing renewable energy on the grid to the benefit of customers.

PROJECT FUNDING

14. As noted in Section 3 of the Feasibility Study, BEC intends to finance the Factorydale refurbishment project through debt borrowing through the use of the Green Municipal Fund ("GMF"), some of which is expected to be in the form of a grant, and any other federal funding that may be received and which currently BEC is applying for.

CONCLUSION

15. The refurbishment of Factorydale represents a critical infrastructure investment for BEC. BEC repeats and relies upon the foregoing and the detailed analysis in the Hysovent reports filed as Appendices to this Application, and respectfully requests Board approval of this Capital Work Order Application in the amount of \$6,000,000. BEC also requests that the Board address this request for approval through a paper process, consistent with the recent process for the community solar garden project.