

F.A.Q.

Mactaquac Generating Station Life Achievement Project

December 2016

1. Why is NB Power recommending Life Achievement as the best option?

This approach has the lowest cost estimate when compared to other options under consideration (and so the least impact on rates over time), and allows NB Power to take into account changes in costs, technology, electricity demand and customer priorities in choosing a path forward as the potential end of life for the station approaches again in 2068. This approach ensures NB Power's ability to fulfill its mandate of providing safe, reliable electricity at low and stable rates while protecting New Brunswick's long-term renewable energy supply.

In addition, maintaining the station reflects our customers' strong agreement on the importance of the environment while respecting their caution on costs. This option reflects the consistent support from thousands of New Brunswickers for investments in renewable electricity here at home, but not at any cost.

2. How much will this project cost?

Total costs to NB Power over the life of the project are estimated at between \$2.9 Billion - \$3.6.

3. Will you be partnering with another company to work on this project?

No. This project and the station will be managed, maintained and owned by NB Power. Services including engineering, equipment supply and maintenance will be contracted.



4. How can you be certain this option will actually work? Last year you said the status quo was not an option. Why does it seem to be an option now?

There are numerous hydropower dams around the world that are affected to different degrees by AAR. There is a long history of these dam's owners, advisors, and academics exchanging information about the behavior of AAR affected concrete, techniques for measurement of displacement, and mitigations.

For the last number of years, NB Power has been continuously testing and modelling the impacts of concrete expansion at Mactaquac to manage its impacts and gain a better understanding of the station's structural integrity and behavior. Recently technology has allowed for more detailed modelling of actual and potential impacts of the concrete expansion at Mactaquac, revealing better structural integrity than was previously understood. These results are consistent with ongoing testing of concrete samples taken from the station. This improved understanding provided NB Power with confidence in the potential for Mactaquac to generate electricity beyond 2030 approximately to its original 100 -year service life.

5. In your discussion paper 'Considering the Future of Mactaquac' released last spring, you described two potential approaches to life achievement. Which approach will you take with this option?

Given the importance of the technical and economic implications of this option, life achievement was explored on two different fronts, each with a different origin and using different teams of experts. Both teams used modelling to establish confidence in the ability of their respective approach to allow operations beyond 2030. Both approaches are derived from actual experiences at other facilities. Experts at Société d'énergie de la Baie James have studied Mactaquac and suggested a plan to adopt a restoration approach that draws on experience with facilities owned by Hydro-Quebec, with particular emphasis on the Beauharnois facility near Montreal. The other approach would involve a partial rebuild of AAR-affected structures and was developed by expert engineers led by Peter Kiewit Infrastructure Co. Having established these two approaches, NB Power will now refine the appropriate approach to life achievement through additional comparisons, refinements and consideration of variations in approach. Both approaches are technically feasible and compare favourably with the other options under consideration.

6. Aren't you just you just passing the cost of dealing with the problem on to future generation?

Not at all. The life achievement analysis considers the cost of managing the end-of-life of the concrete structures in the 2068 timeframe. In fact, the analysis includes those costs, and also captures the offsetting financial benefit of deferring those costs from the 2030 timeframe to the 2068 timeframe. In addition, this allows NB Power to consider changes in costs, technology, electricity demand and customer priorities in choosing a path forward as the potential end of life for the station approaches again in 2068.

7. When will this project start and when will it be completed?

We anticipate the majority of work to be completed between 2020 and 2036.

8. How many jobs will be created from this project and what kind of work will be open to local suppliers and skilled labour?

We expect this project to require the equivalent of up to 170 full-time employees during the construction period. The project will also require engineering services, AAR expertise, civil and various skilled trades to complete the work. It is also expected to require new mechanical equipment that may need to be sourced globally (ie generation turbines). NB Power will undergo a selection process to determine what firms are able to provide the specialized technical and engineering services to complete this work. We anticipate sourcing skilled labour and some materials locally.

As a Crown utility, NB Power is bound by legislation and its own internal processes to ensure fair and competitive pricing and procurement of expertise, goods and services. NB Power will follow the rules it is bound by to ensure a fair and competitive process throughout this project.

9. What kind of work will be done?

Life achievement at Mactaquac will focus on maintaining existing concrete structures and associated mechanical equipment to the original 100-year service life of the station (2068) or as close as possible to it.

The work is expected to involve the following components:

- Controlling water seepage with grouting and surface sealing;
- Repairing damaged and deteriorated concrete including gate guides, bridges and rollways;
- Replacement of assorted mechanical and electrical components including gates, cranes, pumps, piping, cabling and controls;
- Removing and replacing six turbines;
- Modifying powerhouse superstructure;
- Installation of multi-species fish passage.



10. What about fish passage?

NB Power will continue to work with the Canadian Rivers Institute (CRI) and the Department of Fisheries and Oceans to achieve targeted fish passage goals on the Saint John River as informed by science, ongoing studies, input from First Nations and stakeholders and future regulatory decisions.

This option will allow for the addition of multi-species fish passage to the existing facilities, using improved technology and taking advantage of an improved understanding of fish behavior resulting from ongoing research by CRI.

Funding has been allocated in the project budget of up to approximately \$100 Million to ensure installation of adequate multi-species fish passage.

In addition, environmental flow studies being undertaken by the CRI may lead to enhanced flow regimes.

11. How was the public's input taken into account in this decision?

Following our commitment to transparency and accountability, NB Power conducted an extensive public engagement effort on the future of the station that gathered values-based input from New Brunswickers of all walks of life.

Approximately 10,000 shared their views and opinions on the project through open house sessions, community meetings, stakeholder workshops, an online survey, formal submissions and sessions by request. Our What Was Said report details the results of public and stakeholder input received during NB Power's public engagement program, held between September 2015 and May 2016.

In addition, NB Power took the exceptional step of conducting a review of all potential environmental impacts of all the options prior to selecting the preferred path. This Comparative Environmental Review process brought formality, discipline, and transparency to the comparison of the impacts. It also ensured both NB Power and its customers can be thoroughly informed of the potential impacts and to prepare for appropriate environmental approvals in the future.

We also evaluated scientific studies by the Canadian Rivers Institute. In 2014, NB Power invested \$2.3 million in an independent research project with CRI, a collaborative research network based at the University of New Brunswick, to evaluate key environmental challenges related to Mactaquac's future including river health, fish passage and flow management.

12. How was the First Nations' input taken into account? How will they be participating in this project?

NB Power has been having meaningful conversations with First Nations communities along the Saint John River about the future of the Mactaquac Generating Station since 2013.

As a utility, our core values for aboriginal engagement are inclusion, responsiveness and respect. We recognize and respect the unique status and environmental stewardship role of First Nations in New Brunswick.

We have worked closely with each First Nations community to design specific and appropriate methods of engagement and consultation in recognition of their respective interests and perspectives on the Mactaquac project. NB Power will continue to engage closely with First Nations on the life achievement project to facilitate meaningful participation in potential economic opportunities, environmental stewardship of the Saint John River, including fish passage, and other means that recognize and help restore First Nations' connection to the river.

13. How will climate change affect this project? And extreme weather conditions?

NB Power has investigated potential impacts of climate change on the hydrology of the Saint John River as it pertains to production of electricity at Mactaquac. The predictions vary depending on the model used and input assumptions, but the predicted mean annual flows in one study for the year 2080 increase by about 14%. At the seasonal scale, projections at Mactaquac show a winter flow increase and a summer flow decrease for almost all models at the 2050 and 2080 horizons. The predictions are that snowpack will decrease in the future and the spring freshet will begin earlier. Industry confidence in and use of specific modeling results to complement directional results are building, but are not yet adopted broadly. Also, relative to other factors, the magnitudes of the predicted changes in the 25 year planning horizon are not so significant as to warrant a different development plan.

Currently predicted increases in the frequency or intensity of extreme weather conditions with potential to lead to flood conditions are on average small in magnitude and highly uncertain. They are not so significant as to warrant a different development plan. Future predictions of material increases would be considered in future dam safety management planning.

14. How will this project affect the community in the immediate area of the station?

Potential environmental impacts of the Mactaquac life achievement project would be largely focused on the immediate area surrounding the station during work activities.

The head pond levels would remain the same as today. The project would not be expected to result in any changes to the surface water flow regime upstream or downstream.

This option will not require a new public river crossing.

