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Mémoire de la Société Nucléaire Canadienne

In the Matter of the

New Brunswick Power Corporation, Point Lepreau Nuclear Generating Station

Application for the renewal of NB Power's licence for the Point Lepreau Nuclear Generating Station

Commission Public Hearing
Part 2

May 11 and 12, 2022

À l'égard de la

Société d'Énergie du Nouveau-Brunswick, centrale nucléaire de Point Lepreau

Demande de renouvellement du permis d'Énergie NB pour la centrale nucléaire de Point Lepreau

Audience publique de la Commission
Partie 2

11 et 12 mai 2022

Canada

Intervention by the Canadian Nuclear Society (CNS)
Before the Canadian Nuclear Safety Commission (CNSC)

Application by New Brunswick Power
to renew the Operating Licence
for the Point Lepreau Nuclear Generating Station
(Ref 2022-H-02)

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Introduction

The Canadian Nuclear Society (CNS) is Canada's learned society for the nuclear industry. We are a not-for-profit organization representing about eight hundred professionals, scientists, researchers, engineers and other nuclear professionals engaged in various aspects within Canada's nuclear industry. We do not represent any company or other organization within the industry. The CNS believes that the views of Canada's nuclear professionals, as embodied by its learned society, may provide useful assistance to the CNSC in its deliberations on the license extension of the Point Lepreau Nuclear Generating Station (PLNGS).

The CNS has a strong interest in the renewal of the operating licence for the Point Lepreau Nuclear Generating Station under review during Day 2 of the hearings by the Canadian Nuclear Safety Commission (CNSC). Our views outlined below will cover the CNS perspective on the importance of Point Lepreau NGS to the future of CANDU technology, the importance of this power reactor to the ongoing electricity supply for New Brunswick, and the future of New Brunswick's generation of electricity.

The licensing of a nuclear facility is not an abstract activity. To operate, all regulated nuclear facilities in Canada must meet the safety performance requirements of the CNSC. However, all regulated nuclear facilities in Canada exist for important commercial, research, or energy supply reasons. This means that licensing decisions have direct research, technical and commercial consequences. It is the purpose of this paper to provide the views of the CNS on the importance of these licensing renewal decisions.

Electricity in New Brunswick and the changing world energy supply

New Brunswick is a small Province. Its total annual electricity consumption is approximately 12,000 GWh, of which some 30 per cent is produced by the Point Lepreau Generating Station. Total generating capacity in the Province is about 4,500 MW from a variety of thermal, hydraulic, nuclear and wind sources, of which Point Lepreau constitutes about 15 per cent. Point Lepreau produces annually about 4.8 TWh of electricity. It provides this power on a firm, not variable basis.

It is thus apparent that Point Lepreau produces a far larger share of New Brunswick's electricity production than simple name plate rating would indicate. Moreover, about five per cent of the electrical production of Point Lepreau is exported to Maritime Electric in Prince Edward Island.

Therefore, the operation of Point Lepreau affects not just electricity supply in New Brunswick, but also that of Prince Edward Island. That Province imports about 60% of its total electrical energy demand from New Brunswick, made possible only by nuclear generation from Point Lepreau.

At this time, New Brunswick cannot replace any lost generation from Point Lepreau easily. While possible, at considerable expense, during the refurbishment outage by out of province purchases, the cost of this would be prohibitive on a long-term basis. Moreover, NB Power does not have access to natural gas supplies which would allow rapid construction of gas-fired generating plants. Lost nuclear generation at Point Lepreau would result in increased reliance on fossil fuel generation at places like Belledune and Coleson Cove (coal- and oil-fired, respectively).

In this context, recent changes in world energy supplies need to be taken into consideration. As a result of Russia's invasion of Ukraine and the resulting sanctions against Russia, which produces ten percent of world oil supplies and forty percent of Europe's natural gas, world oil and gas prices have hit historic highs. Europe has already started to restructure its energy mix to not be reliant on Russian gas, with Germany considering restarting its coal and remaining nuclear plants. As a result, the world's energy supplies are changing significantly, with volatile prices and less secure access. This will affect Coleson Cove – an aged plant used for peaking purposes - in particular, possibly resulting in the plant no longer being economical to operate.

Other than some hydraulic energy, Point Lepreau is the lowest cost source of electricity in the province. Indeed, in large part because of Point Lepreau, NB Power has the lowest cost consumer and industrial rates in Atlantic Canada. The loss of Point Lepreau would therefore deal significant damage to the economy of the province and to the standard of living of its citizens. In addition to contributing to low stable electricity rates, Point Lepreau provides a significant contribution to the economy of the Province of New Brunswick, both in terms of direct employment of about eight hundred highly skilled well-paying jobs, and for the goods and services associated with the operation and maintenance of the facility, and all the subsequent spin off economic benefits to support this.

With knowledge and experience gained from refurbishment and return to service of Point Lepreau, New Brunswick is now in the position of being able to consider the future of its electricity system. The future of two important stations is now in some doubt, Belledune and Coleson Cove. In the case of Belledune, this 450 MW coal-fired station entered service in the early 1990s and is now more than halfway through its useful life. It is dependent upon imported coal, as coal is no longer mined in New Brunswick. Moreover, both the Government of Canada and the Government of New Brunswick have indicated a desire to reduce emissions of carbon dioxide, as well as other pollutants such as particulates, from electricity generation. This cannot be done by continued operation of Belledune, and it cannot be done by curtailing electricity production from Point Lepreau.

Similar arguments prevail with Coleson Cove. This 979 MW oil-fired plant entered service in the mid-1970s. Dependent on imported bunker oil, this plant is the most expensive to operate of all of NB Power's large generating facilities. Operating at full capacity, it is also the largest emitter of carbon dioxide and other pollutants of New Brunswick Power's non-nuclear major generating stations.

With its two largest fossil-fired stations in need of future replacement, the issue for New Brunswick is what will replace them. There are some who insist that various forms of renewable energy, principally wind generation, can do this. This notion can be immediately dismissed. The problems encountered by Ontario in incorporating renewable generation into its electricity system proved insoluble. The CNS does not believe that any form of renewable generation, solar or wind, can be increased to produce the 4.8 TWh generated by Point Lepreau annually. A small province such as New Brunswick with a relatively fragile economy cannot entrust its future to generation methods which have thus far proved sporadic, expensive, and unreliable. Even should the problems of cost and unreliability be resolved, the number of such facilities that would have to be constructed is simply impossible, with the added burden of extensive, adverse environmental effects. It is also the view of the CNS that new electricity supplies from the proposed Lower Churchill River will not be available within the foreseeable future

Thus, failure to renew the operating licence of Point Lepreau would result in greater reliance on fossil-fueled generation, with attendant greatly increased uncertainty and cost, not to mention atmospheric emissions.

Former New Brunswick Premier Frank McKenna noted in a column published in February 2017 that the best solution for New Brunswick's electricity future is a second nuclear power reactor in the province. Indeed, a second CANDU 6 reactor would largely replace the electricity generation from Belledune or Coleson Cove. As Mr. McKenna noted in 2017, the most efficient location for such a second reactor would be at New Brunswick's existing nuclear site at Point Lepreau.

The CNS agrees with Mr. McKenna on this matter. The CNS notes that the province of New Brunswick has entered into a partnership with Ontario, Saskatchewan, Alberta to develop new small reactor technology (SMRs) capable of providing electric power on a reliable, cost-effective basis (indeed, Ontario Power Generation has indicated that its future nuclear build will be an SMR, subject to regulatory approval). In so doing, New Brunswick can build upon the expertise in nuclear technology and skilled labour created by Point Lepreau to expand the province's nuclear generating base. The CNS notes that small modular reactors may lend themselves to unit sizes more readily incorporated into a smaller electrical grid such as that of New Brunswick.

The prospect of building a new nuclear plant in the province would be made much easier if the existing facility continues operation. Operating experience from the existing plant would be readily transferrable to any new nuclear facility.
It should be noted that the Province of New Brunswick has a vehicle rebate program in place for a variety of electric vehicles. If this program is to produce any significant change in vehicle use in the province this will mean additional demand for electric power. The most economic source of new electricity generation on a reliable basis is nuclear power. Any additional uptake by customers in EVs can be expected to add to electricity demand in the province and thus need more nuclear power. The same comment could be made on any future incorporation of hydrogen in NB's energy mix, since barring technological advances elsewhere, the most cost-effective method of hydrogen production is through the electrolysis of water and in order to do so, sufficient electrical generation capacity needs to be in place

The importance of Point Lepreau to CANDU technology

Currently, there are nine CANDU 6 reactors in commission. One is in Canada, three in South Korea, one in Argentina, two in Romania, and two in China. Of these reactors, the oldest in service is the Point Lepreau Nuclear Generating Station.

Thus, Point Lepreau serves as the reference plant for the CANDU 6 fleet on a global basis. This operating experience is transmitted to other such reactors around the world through organizations such as the CANDU Owners Group (COG).

Operating since 1982, the Point Lepreau reactor has not just the longest service life but has also demonstrated a very high performance in both safety and electricity production over its 37 years. Point Lepreau was the first CANDU 6 reactor to encounter age-related challenges. It was the first CANDU 6 to undergo pressure tube replacement and plant refurbishment. The return to service of Point Lepreau from its refurbishment outage in 2012 demonstrated that CANDU 6 reactors can be refurbished to meet current regulatory standards, not simply the ones to which they were originally constructed.

It should be observed that Point Lepreau has improved its safety systems considerably beyond as designed and built in the 1970s. Point Lepreau completed its plant refurbishment in 2012, but it also underwent considerable safety system reinforcement over a series of upgrades after the Fukushima accident in 2011. These upgrades were the subject of the CNS intervention in the renewal of the Point Lepreau operating licence in 2017.

It should also be noted that NB Power has now accumulated approximately 40 years of operating experience with its reactor. This is a highly experienced organization with strong valuable skills in optimizing the safe operation of a power reactor. This experience will be extremely valuable in looking to the future of New Brunswick's electric generation.

Other CANDU 6 reactors that have undertaken and completed refurbishment are the Wolsong 1 unit in South Korea; and, the Embalse unit Argentina. The life extension program for Cernavoda 1 in Romania has been announced and will start at the end of 2026. The Chinese utility, TQNPC (CNNO) owner and operator of its Qinshan 1 and 2 CANDU 6 Units has started its planning process for the refurbishment of these units in 2032/2033.

In being the first CANDU 6 reactor to complete successfully full-scale refurbishment, Point Lepreau generated an enormous quantity of essential engineering and construction information. This information proved highly valuable to the Korea Hydro and Electric Power Company (KHNP) for its work on Wolsong 1, as well as for the life extension project at Embalse, Argentina. The remainder of the CANDU 6 fleet is generally much younger than Point Lepreau, but the lessons learned from its refurbishment continue to provide valuable information for these utilities both for current operations and future refurbishment decisions.

Canada is one of the very few nuclear nations, along with South Korea and Argentina, to successfully refurbish and return to service power reactors including replacement of internal reactor components. Point

Lepreau has been accompanied by the full refurbishments of Bruce Units 1 and 2, and Pickering Units 1 and 4. At this time, Ontario Power Generation (OPG) and Bruce Power are completing refurbishment of the Darlington and Bruce nuclear generating complexes. As such, Canada has acquired a body of technical knowledge unsurpassed on a global basis on the refurbishment of power reactors.

Conclusions

NB Power is a qualified and experienced nuclear operator. It has extensive processes and programs in place. It has well trained, qualified, and engaged staff which operate and support a well-designed and maintained nuclear facility. It produces low-cost electricity in a safe and reliable manner, all the while providing due protection for the health and welfare of the staff, public and environment.

The CNS is therefore of the view that operation of the Point Lepreau nuclear power station must continue, provided that it meets all of the safety requirements of the CNSC. Our reasons are as follows:

1. New Brunswick Power has demonstrated a solid safe operational record by its trained and dedicated operational, maintenance and technical work force.
2. Nuclear power is essential to New Brunswick for the supply of base load electricity that cannot be provided economically from any other available source.

3. Electricity supplied by Point Lepreau is an essential part of that base load electricity supply, meeting 30 per cent of New Brunswick's total electricity demand.

4. Any premature loss of generation from Point Lepreau cannot be met in the short term by either construction of new generating facilities or by increased imports from other jurisdictions.

5. NB Power has demonstrated in dialogue with the CNSC a strong response in emergency preparedness and investment in attendant equipment and personnel.

6. New Brunswick's nuclear program is a strong ongoing source of high technology employment for engineers and skilled trades, providing a solid base for both the province's industrial capacity and academic and apprenticeship training programs.

7. Nuclear power is essential if New Brunswick is to align with federal government policy in reducing atmospheric pollution.

Therefore, the Canadian Nuclear Society supports the application by New Brunswick Power for the renewal of its operating licence by 25 years for the Point Lepreau Nuclear Generating Station.