Commentary re NB Power Rate Increase 8.9% for 2023/24
(New Brunswick Energy and Utilities Board Matter #541)
Submitted by Coalition for Responsible Energy Development -NB

Coalition for Responsible Energy Development: Perspective

The Coalition for Responsible Energy Development in New Brunswick (CRED-NB) is an environmental advocacy organization advocating for affordable, reliable clean energy from renewable energy sources – wind, water, solar and geothermal with appropriate storage and related grid support – for New Brunswick. CRED-NB comprises 10 core groups and more than 100 individuals who support our objectives, listed at https://crednb.ca/about/ .

Initial Ratepayer Concerns re NB Power's Application for an 8.9% Rate Increase

The announcement of the 8.9% proposed increase in our electricity rates arrived as a shocker for most New Brunswickers, given the current high inflation affecting all other basic living costs.

Learning that even this increase, will not reduce the utility's current debt of over $5Billion, now projected to increase by another $100 million by year end 2022/23, is downright troubling.

The future is even more troubling considering additional projected yearly 8.9% increases for the subsequent two years in order to begin reducing the debt, building toward the goal of 20% equity. In effect, this would represent a compounded increase in electricity rates in excess of 29% over three years from 2023/24 to 2025/26.

What are the Responsible Options?

Given the financial and regulatory reality facing NB Power, it would be irresponsible to argue for delay or reduction of the overall increase requested this year. The distribution of the increase, however, should be open to analysis and negotiation given the differences in 'ability to pay' of the various ratepayer categories. Increasing the accessibility of the provincial Energy Efficiency Programs to buffer the impact of rate increases by reducing power usage, will be of even greater importance.

How did New Brunswick arrive at this 'Hobson's Choice'?

Since the EUB is 'free to decide', but only the option of a significant rate increase is viable, the point of this CRED-NB submission is not to argue about the short-term rate proposal. It is to raise the longer-term question, "How did we get here?", so as to discern the best ways out of this dilemma. We need to ask, "What long term planning and investments could have avoided this precipitous state, facing an 8.9% increase?" and "How can we take advantage of a range of proven, cost-effective, modern technologies to recover financial stability through reliable, affordable electric power for New Brunswick as we transition other sectors of the economy to electricity?"

Looking at Current Energy Investment Options & Cost Projections

The OCAA (Ontario Clean Air Alliance) 2021 survey of electricity options (https://www.cleanairalliance.org/wp-content/uploads/2021/01/options-2021.pdf), reporting industry cost projections for Ontario, provides a useful starting point. In increasing order of cost, it lists the full mix of sources:

Non-Emitting Energy Sources	Cost per KW in cents (Can.)
Energy Efficiency	1.7
Quebec Water Power - spot market	2.2
Quebec Water Power – firm contract	5.0
Solar	3.8 to 5.5
Onshore Wind	3.4 to 7.0
Price of Nuclear 2021	9.6
Offshore Wind	11.2
Price of Nuclear Power 2026 (Darlington Refurbishment Costs)	12.8
Proposed new GTA reactor (GE-Hitachi Small Modular 300 MW – BWRX 300) for 2029	16.3
(Fossil Fuel Options+ carbon price not listed)	

As of June, 2022 NB Power relied on the following electricity mix:

*Energy Source	% of total capacity	% of in-house Capacity
Fossil Fuel	50.97%	59.13%
Hydro	20.22%	23.46%
Nuclear	15.01%	17.41%
Other renewables – all contracted, incl 25 MW hydro and (359 MW Wind)	13.80% (8.20%)	

**Using NB Power Annual report figures*

How NB Power's mix creates current and long-term vulnerabilities

NB Power's document outlines the impact of those costs which are beyond their control while operating under this current electricity mix. This helps to illuminate how a different mix might have expanded our current options.

- ***Cost and price volatility of all fuels and purchased power increased between 58% and 158%.*** Power from sources such as wind, solar and geothermal uses no purchased fuel and so is not subject to fuel price inflation. A variety of new storage technologies suited to the power generation location and supported with flexible smart-grid technology, can ensure reliability for the limited periods of wind or solar intermittency. This renewable capacity, if built in advance and at scale to allow for some redundant capacity, could also avoid the need to purchase power in the current inflated power market.

- **Cost of federally regulated carbon pricing is increasing each year.**
  Carbon pricing is levied on fossil fuel only, i.e., applies to 59.13% of NB Power's capacity. It would not apply to renewable power capacity, and thus, much of that current cost increase would be avoided if renewables were a larger part of the mix.

- **Higher than anticipated interest rates, largely increasing the cost of carrying the debt.**
  The bulk of the debt carried by NB Power, falls from the 2008-2012 refurbishment of the Point Lepreau nuclear plant and from additions to debt from the plant's performance problems since 2012 which have required additional capital expenditures and purchase of replacement power to cover outages. Forward planning and implementation of additional renewable power over the past decade, as the cost of building wind, solar and storage gradually fell, and low interest rates were available, could have avoided adding replacement power purchases to that debt during this period. This lower cost power could also have provided a larger profit margin on domestic sales and on any excess power exported, as a means of paying down the initial capital investment for renewables.

Conclusion: More options for electricity rates would flow from more aggressive investment in renewable power.

Investment in renewable power capacity within NB Power over the last decade could have reduced the current debt by providing cost-effective in-house replacement power, cushioning the impact of unplanned nuclear outages. It would also be providing low cost replacement power now as an alternative to burning fossil-fuels at inflated prices, particularly during the shut down of the privately-owned Kent Hills wind farm. Lastly, New Brunswick would be already well positioned toward the 2030 phase-out of the Belledune coal burning plant and meeting the 2035 target of 'Net Zero' emissions.

A new paradigm for power generation and distribution is needed for New Brunswick

Mycle Schneider, lead author of the 2021 "World Nuclear Industry Status Report" who is also a recognized 'baseload' expert, shared his insights in a UBC School of Public Policy and Global Affairs webinar, October 6, 2021, that a new paradigm for power generation was needed, commenting that "Baseload is out the window!"

Whether or not NB Power's professional cadre has ever considered a new model, publicly the corporation has dismissed 'out of hand', the idea of transitioning electric power to more decentralized, lower cost, renewable power sources. The dismissive phrase, repeated with benign amusement by both NB Power officials and government ministers, is that these are considered unreliable, "when the wind doesn't blow and the sun doesn't shine". There is no acknowledgement that a matrix of solutions, including storage and grid technologies can provide a reliable, cost effective renewable energy alternative.

Models for a new paradigm exist that might be adapted to New Brunswick

NB Power purchases wind capacity of 359 MW, i.e., 8.2% of total capacity under contracts. This represents 458 KW of wind power per capita, compared to Nova Scotia at 637 KW and PEI at 1,296 KW per capita. The Canadian Wind Energy Association's strategy at the end of 2020 was to meet 20% of Canada's energy needs by 2025.

Already Germany, Spain, the UK and Sweden met 20% or more of their electricity needs from wind energy at the end of 2021. The UK increased its use of wind energy from 21 % to 26.8% by the end of 2022!

An MIT Study indicates that the lowest cost storage option for wind and solar is Hydro Quebec's reservoirs, an option on offer from them https://dspace.mit.edu/handle/1721.1/130577. The proposed 'Atlantic Loop' would connect the New Brunswick grid to Quebec and Nova Scotia. Another low cost option for storing wind and solar and providing it back to the grid is our electric vehicle batteries https://www.cleanairalliance.org/wp-content/uploads/2022/01/Vehicle-to-Building-and-Grid-for-Peak-Needs-November-22-2021-1.pdf. The only incremental cost for these options is connecting them to the New Brunswick electricity grid.

A complete model for transitioning to wind power in New Brunswick has also been provided by Chris Rouse, New Clear Free Solutions (https://newclearfreesolutions.com/) . The plan is largely self-financing, after an initial investment, by the compounding margin from sales of the resulting low-cost power while maintaining current rates.

Saint John Energy's Burchill Wind Project, soon to bring wind powered electricity on line for local sale to customers in Saint John is another obvious model, as it is committed to "..use financial proceeds to maintain stable rates and highly reliable grid."

In short, models are available to NB Power for considering a transition to wind powered electricity. Models for transitioning to other renewable power are also available in other jurisdictions.

Challenges to making a 'Paradigm shift' for cost-effective, decentralized power generation

All change will require moving from a 'known state' to one not yet experienced, even if there are successful models to follow elsewhere. Given the centrality of electric power to the comfort and safety of the citizens and to the operation of the New Brunswick economy, a conservative approach to transition is understandable and even desirable, so long as it does not amount to paralysis against the changes which offer significant benefit. The decades-long delay in building out renewable power such a wind capacity, now however, makes it urgent to implement the earliest possible form of affordable renewable power generation. That requires an examination of the ongoing distractions from pursuing that goal.

Historical Distractions: Point Lepreau Nuclear

In NB Power's case, a key factor in the failure to consider a new paradigm is the ongoing fascination with complex nuclear-powered generation at Point Lepreau. This fascination is captured first in the history of the CANDU 6 generating station. Through all phases, - from initial build, to refurbishment, to current operations – it reveals a litany of escalating capital costs, lost years/months in delivering power generation for sale, and increasingly problematic operations as the plant ages – requiring diagnosis and solutions. Significant costs of additional capital repairs and replacement power also distract from long term investment options, 'rachetting-in' commitment to the Point Lepreau plant.

Initial Build

- 1972 began talks with the federal government
- 1974 January, federal loan for half costs of first nuclear plant on Canada's east coast
- 1975 March, Premier's decision to build, regardless of an environment assessment
- 1975 May, AECL authorized construction of two reactors on 4 unit Point Lepreau site
- NB Power began construction: initial estimate $466, by 1974 estimate was $684
- 1983 Lepreau power was commissioned: Actual cost $1.4 billion, excluding interest, for 25 year life to moth ball in 2008

Refurbishment

- 2000 began debate re estimated $750 million refurbishment cost, given early problems emerging due to inadequate maintenance
- 2002 NB Power, supported by both Government and Opposition pressed for refurbishment at estimated $935 million.
- Comprehensive EUB hearings concluded "there is no significant economic advantage to the proposed refurbishment" and "it is not in the public interest".

- 2004 April, Report by former British Energy chair Robin Jeffrey estimated $1.36 billion
- 2005 July, NB Power denied a federal grant, but awards contract to AECL for $1.4 billion
- 2008 March, refurbishment began for 18-month plan w AECL as lead contractor
- 2009 October, announced delay to Feb 2011 (Technical glitches/incidents) and province requests federal money to cover replacement power cost.
- 2009 October 29, Lepreau to be sold as part of NB Power to Hydro Quebec March 2010 no sale because of Hydro Quebec concern re 'unanticipated costs'.
- 2010 October, announcement AECL to replace all calandria tubes and reinstall 2nd time
- December 2012 Hydro Quebec closes Gentilly2 675 MW CANDU-6 for decommissioning.
- November 2012 restart Lepreau at $1 billion over budget ($2.4 billion) and three years late (4.5 years)

Post Refurbishment Performance problems/Unplanned outages

- Performance did not meet full power expectations (85% versus 91%), until additional capital expenditure of $500 Million by 2019
- July 2022 more than 8000 hours lost due to unplanned outages in 10 years, plus100 day outage in summer 2022, plus current Dec 2022/January 2023 3 weeks going on four, plus plan to complete capital work not done in summer 2022 to be 22 days in April 2023. (Accumulated debt exceeds $5 billion.)
- World context – aging reactors – 35% of France's aged light water nuclear fleet on outages for problems mid-summer 2022

NB Power Application for 25-year Lepreau operating licence extension – CNSC Hearings May 2022

- In spite of ongoing unplanned outages and unplanned capital expenditures, for an aging reactor where these problems typically occur more often, NB Power applied for unprecedented 25-year operating license renewal following their 5 year license.
- In their application it was clear that 'end of life decisions' for the plant were open to the possibilities of both, decommissioning and a second refurbishment. Since the decommissioning plan submitted with the application was a generic one without the details of what actual costs and contamination-challenges they would face, the delusional idea of another refurbishment seems to have been a genuine consideration!

With what money a future refurbishment would be funded, given the debt ongoingly being incurred, is left to internal calculations to reveal, or to the Gods to discern!.

Only a form of fascination with the Point Lepreau nuclear complexity that seems to have mesmerized technical leadership, OR the temptation to rachet in new money to save all the previous investment, could explain the repeated decisions to plan for long term operation of Lepreau, which mitigates against considering the critical new paradigm, involving increased renewable power.

Distraction from Transitioning to Renewable Energy: Human Resources Allocation as Indicator

The commitment of disproportionate human resources, as reported in NB Power's Appendix Ei, reflects the distraction in attention away from a needed transition. The nuclear division generates 17.4% of the in-house capacity which represents 15% of total corporate power capacity. Human resources assigned are 40 of the 214 non-union employees (15.4%) and 876 of the 2508 unionized employees (34%) i.e., a much higher proportion than warranted by their portion of power generated. This disproportion increases if a share of the human resources in other services which the nuclear division relies on, is allocated to nuclear power i.e., corporate services, business development, marketing, customer service/distribution and transmission& systems operations.

The salary and benefits levels earned by employees of the nuclear division, compared to other divisions, would also be of interest in this context. NB Power's description of succession planning where the nuclear division's 'Time to talent certification' can be multiple times longer than for non-nuclear jobs, would imply a higher level of knowledge and hence, higher level of wages and salaries. Are those nuclear employment costs, learning curves and related recruitment and retention challenges warranted by the resulting power production compared with other power sources?

Distraction by the 'New Nuclear' Dream – Small Modular Reactors

Now this same expensive 'nuclear fascination' is being extended through NB Power's engagement with, and siting of, experimental development versions of unproven 'advanced' Small Modular Reactors, currently existing only in computer models . There are two such projects: a 'sodium cooled' fast reactor being developed by American based ARC Nuclear, and a 'molten salt' reactor incorporating a reprocessing facility to extract plutonium from high level nuclear waste, being developed by UK-based Moltex Canada. These are already encountering head winds with the loss of Russia as a source of the highly assay low enriched uranium fuel (HALEU) which they require.

A staff complement of six for the SMR initiative is already included in the current Lepreau Division budget – one regular position and 5 term positions. Since both proposed SMRs are still in design phase, it is not clear why NB Power would already be expending salary which would normally relate to an onsite building stage. This is well in advance of the projected 2029 to 2040's possibility of producing commercial power by ARC and Moltex respectively. Thorough critiques of the economic viability and safety claims for SMRs, as well as documentation of past failures of related reactor technologies, are available from a number of expert sources. (The Union of Concerned Scientists published report by Edwin Lyman March 18 2021 at https://www.ucsusa.org/resources/advanced-isnt-always-better) The two SMRs being developed in New Brunswick represent two of 150 models of SMR technologies being

developed world-wide. Both are considered more 'advanced' i.e., using non-water cooling systems and therefore more experimental, approaches compared to the GE-Hitachi BWRXX—300, water-cooled model proposed for the OPG Darlington Ontario site.

Small Modular Reactor technologies in development, with very uncertain outcomes for possibly connecting to the commercial power grid, should not be allowed to distract New Brunswick from the need to begin building renewable power now!

Distraction from Transition: Federal Government 'facilitates' civil nuclear energy while obscuring geopolitical goals.

Round 1

The Government of Canada, having emerged from WWII, became a significant supplier of uranium and a small amount of plutonium for use in nuclear bombs. It maintained Canada's nuclear research capacity at Chalk River and developed small experimental 'research' reactors. The 'Atoms for Peace' narrative provided a rationale for continued research and in 1952 the government formed Atomic Energy of Canada Limited, a Crown corporation with the mandate to "develop peaceful uses of nuclear energy". In partnership with the electricity industry, AECL developed small and unreliable reactors which, nevertheless, provided a basis for the development of the fleet of full-sized CANDU reactors for electricity production. The first large scale power plant began construction in 1964 at Pickering, Ontario, starting operations in 1971.

New Brunswick appears to have been the recipient of federal largesse in promoting the CANDU brand beyond Ontario. Like other jurisdictions without high borrowing capacity – such as India in 1956 and 1966, Pakistan in 1964 and Argentina in 1972, New Brunswick received support for the building of a CANDU-6 power plant in the form of generous loan conditions offered for half of the projected cost. This clearly seduced the province to take on the nuclear option for generating electricity, as approximately one year later, this led to the unilateral decision by Premier Hatfield to build the nuclear plant, despite misgivings by part of the population and despite the ongoing Environmental Assessment. Following AECL's approval for two plants, NB Power built the first plant at Point Lepreau, commissioned in 1983 at a cost of $1.4 billion, roughly triple the earliest estimate.

Although the federal government denied a request to provide funding for refurbishment of the Point Lepreau reactor, and although the EUB wisely and firmly recommended against it after comprehensive hearings, NB Power, with the support of both the Progressive Conservative Government and the Liberal Opposition, approved proceeding with the refurbishment in 2008. The lead contract was then given to the federal Crown corporation, AECL, and ended up costing $1 Billion over budget and being delayed by three years over the original estimate of 18 months. As costs of replacement power mounted, a request for federal money to help cover costs was made and also denied, and the sale of NB Power to Hydro Quebec was then considered and subsequently rejected. The current NB Power debt dates largely from this period and from subsequent problems in the plant's power production. Subsequently an

insurance claim was settled for a limited portion of the overrun. Some mediation efforts were under way with AECL in 2019.

Since the refurbishment, requirements for further capital expenditures, less than expected power production and increasing unplanned outages have added to that debt, without any compensatory federal funding for the inadequacy of the refurbishment accomplished under the AECL contract.

Conclusion

Federal largesse appears limited to getting provincial buy-in to nuclear technology, but not to alleviating the impact of problems encountered with it by a small provincial economy and population, once they do implement a nuclear option.

Round 2

Another round of nuclear seduction is just beginning as the federal government is now playing a facilitating role in promoting 'new nuclear', i.e., the small modular reactors, with uncertain outcomes.

The federal leadership in SMR development by partnering with the nuclear industry preceded public announcements of the SMR initiative by several years. In the 'Generation Energy dialogue' in 2017 Natural Resources Canada determined the need for partnership "to realize the potential for SMRs" and convened the 'SMR Roadmap' project with utilities, provinces/territories, nuclear industry related companies and organizations, and some potential end users (indigenous communities, heavy industry), to "explore the potential scope for a national path forward for SMRs"

The SMR Roadmap initiative convened 109 'partners'. Of these, 16 are claimed to be the 'civil society and education' sector. Eight (8) of these are implied to be unbiased encouragers of public discourse on the topic of 'clean energy', whereas a look at their websites reveals that they are already committed supporters of nuclear energy. Another 7 of them are committed to the nuclear industry based on their interest in the potential for high paying jobs in the industry. As an example of the education interests, the "United Nations Association in Canada" held "..a day for young professionals to discuss, debate and negotiate the role of SMRs in a decarbonized energy system in Canada…". Given the range of SMR technologies, the complexity of nuclear technology issues, and all other decarbonized forms of energy to be considered, a one-day event is hardly an honest form of consultation!? Further, these sessions began by unquestioningly accepting the centralized 'baseload' paradigm, which became the reason for concluding that only nuclear could accomplish the goal.

So, the 'SMR Action Plan' was sprung on the Canadian public 'fully formed' in December 2020 and funding announcements for specific companies' SMR development projects followed over 2021 and 2022.

At no time was there open public consultation testing the social acceptability of expanding nuclear power in Canada through SMRs, compared to renewable power options. The government may have already intuited limited support as reflected in the subsequent "National Survey Clean Electricity Regulation", prepared by Louise Comeau, CCNB, November 2022.

In the meantime, the draft new federal Impact Assessment Act, which is now Canada's environmental protection law, was being altered to accommodate SMR technology as a result of concentrated lobbying by the nuclear industry, and, most egregiously, lobbying by Canada's 'independent' Nuclear Regulator, the CNSC. Although nuclear energy is a federally regulated industry, SMRs with specified thermal power levels, equivalent of up to 300 MW of electricity, which are sited on existing traditional CANDU nuclear power plant sites, were exempted from federal Impact Assessment by changes made to the draft legislation! CRED-NB recently requested the Minister of Environment and Climate Change Canada to override this SMR exemption and designate the ARC SMR for an IA, because of its specific impact potential. It emerged that even MPs who helped pass this legislated exemption are not aware of the import of what they approved in the 2019 Impact Assessment Act. The Minister for ACOA received a copy of our request to Minister Guilbeault and responded with assurances that SMR's would automatically undergo a thorough Impact Assessment! Our request for this IA designation has now been rejected by the Minister.

The federal government has been playing a role, not only in reducing regulatory examination of these proposed, design-only, and hence unproven, 'small' reactors, but in actually funding much of the research and implementation in many funding guises. A total of five parliamentary committees with related funding at stake, have now considered support for SMRs. Most of the MPS from the Government and the Official Opposition have used these hearings to blatantly promote SMRs, rather than use the opportunity for critical learning, so as to perform their role of 'due diligence'. The Moltex 'molten salt' SMR project, with its integrated plutonium extraction 'reprocessing' unit, received $50.5 million in federal funding on March 18th 2021. It is clear from Premier Higgs' June 19, 2020 response to CRED-NB's letter of concern about proposed SMRs, that promised federal funding was a big enticement to inviting and contributing initial provincial funding to the two SMR Projects in New Brunswick. His letter spells out: "Should the technologies not reach commercialization, New Brunswick will still have received important economic activity associated with the research and design…."

The federal department of Natural Resources has become the chief promoter of SMRs and the megaphone for the unproven claims of these not-yet-existing units, as if they had already been built and tested. Their, oft-repeated, catch phrase insists that nuclear is needed to reach net zero emissions in Canada. This is repeated again and again, in spite of expert energy modelling to the contrary, and yet repeated without the integrity of addressing those models with any science- based critique. (Roadmaps by Mark Jacobson's group, modelling 100% renewable energy for all sectors in 139 Countries, including Canada are described at: . https://web.stanford.edu/group/efmh/jacobson/Articles/I/CountriesWWS.pdf)

Conclusion

What is clear from the federal government's role in this SMR nuclear initiative, as well as in past CANDU promotion, is that the Government of Canada has geopolitical goals for nuclear Research and Development, and economic goals in support of export sales of uranium, that may well NOT be aligned with the interests of the New Brunswick Public.

NB Power and the politicians and public of New Brunswick need to carry out the best possible 'due diligence' when engaging with federal government incentives on nuclear. This SMR initiative looks like another 'Trojan Horse'. When it is fully unleashed it will be another distraction from the transition we so urgently need to make now!

Respectfully submitted
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Note: *This written commentary is being submitted to the EUB in response to NB Power's application for an increase to electricity rates, Matter #541, following withdrawal of CRED-NB from formal Intervener status. As a volunteer organization, we do not have the capacity to engage the formal hearing process without funding for expert advice on procedural and substantive aspects of the official Hearing.*