Comments on the Draft EIA Study Guidelines for NB Power's SMR Demonstration Project

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The following submission comments on the draft EIA study for NB Power's SMR Demonstration Project proposed for Point Lepreau, describes CRED-NB's concerns, and recommends topics for the EIA study to examine.

A list of recommended studies, reports and articles can be found on pages 4 and 5.

For more information, contact

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Thank you for this opportunity to comment.

Fuel challenges

- **The EIA study must compare the climate and financial costs of waiting years for the U.S. to ramp up supplies of enriched, or HALEU, fuel for the ARC SMR** against immediately reducing emissions by investing in mature, faster, cheaper renewables with efficiency and storage.

Too late for the climate crisis

- The authoritative 2022 study by the U.S. National Academies of Sciences found that **SMRs like the ARC-100 will struggle to achieve deployment by 2050,** too late to avoid climate breakdown. (page 54).

Safety

- **Information from ARC that its SMR's safety systems will function as the company described** in its first CNSC Vendor Design Review must be confirmed by the EIA Study.

Risks of accidents and malfunctions

- **The potential risks of locating several reactors at Point Lepreau, their interactions, and the impacts of an accident involving multiple reactors must be examined,** and the study area and Emergency Response Plan must encompass this larger territory.

- **Most of the reactor buildings are "designed to withstand earthquakes, hurricanes, other site hazards, and aircraft crash impact", but this isn't specified for the reactor maintenance and radioactive waste building** which must securely isolate radioactive wastes from humans and the biosphere (page 50)

Climate threats

- **With the reactor grade level at least 12.8 meters higher than current mean sea level, assessment of the ARC-100's vulnerability to hurricanes, storm surges and tsunamis must account for ongoing sea level rise.** (Page 44)

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High electricity rates

- E**lectricity from SMRs is expected to be more expensive than wind and solar because small reactors lack the economies of scale of large reactors, themselves uncompetitive.** The authoritative Lazard's Levelized Cost of Energy 2023 shows electricity rates from utility-scale solar with storage and offshore wind ranging from $42 to $140 per megawatt hour (MWh) whereas electricity from large nuclear plants ranges from $141 to $221/MWh. (Page 5)

Alternatives to the Project

- **A full feasibility study comparing the costs and timelines of a renewable energy-based grid to one with SMRs as central must be done during the EIA** and the comparative climate, environmental and economic data published in the EIA study. (Page 77)

Why NB Power doesn't centre renewables

- According to NB Power, an electricity supply based on renewables, electricity imports, battery storage and fossil fuel generation at extremely low capacity factors would be unreliable and insufficient for predicted demand; however, the real reasons seem to be that it wouldn't **"progress New Brunswick's plans to become a centre of excellence for the development of the advanced SMR technology ",** or support **"New Brunswick's commitment to demonstrate SMR development and deployment".** (Page 9-10) The EIA study must compare the evidence for the reliability and sufficiency of both renewables with efficiency and storage and SMRs using research from experts independent of the governments, the nuclear industry, the utility and the CNSC.

Managing radioactive wastes

- **SMRs like the ARC-100 will produce 30 times more long-lived waste from steel, concrete and equipment than large reactors**, so plans and budgeting for the safe management, storage and disposal of this waste, the province's responsibility, must be in place before work on the project begins. (Page 10),

- **Radioactive gasses such as argon-41 will be emitted periodically during SMR operation.** (Page 79) When developing a waste management plan the proponent must identify the full inventory of radioactive gasses, their exposure hazards to workers and the public, and ensure that the regulatory release limits are protective of human health and the biosphere.

ARC-100 waste challenges

- **Over two decades of attempts at the U.S. Idaho National Laboratories costing hundreds of millions in taxpayer dollars have failed to remove even half the sodium from waste fuel similar to that of the ARC-100 to make it safe for disposal in a Deep Geological Repository (DGR).** Canada has no DRG to put this waste in, and the one proposed for northern Ontario is designed for waste from CANDU reactors like Point Lepreau, not SMRs like the ARC-100. (Pages 4 and 6)

Preventing nuclear weapons proliferation

- **Before work begins on the ARC-100, a breeder reactor, the proponent must provide permanent, legally-binding guarantees that this and any future ARC SMR proposed for New Brunswick will never breed plutonium,** the explosive in nuclear weapons, (page 2-3) nor will plutonium ever be extracted from ARC's waste nuclear fuel by Moltex's proposed reprocessing facility. The 2022 National Academy of Sciences study found that Moltex's method would not prevent its plutonium from being used in nuclear weapons. (Page 211)

Several infrastructure designs still not finalized

- **The designs of several facilities, such as the switchyard (p 58) and the circulating cooling water system (ibid p 56), have not been finalized.** A comparative, fully-costed study of the design options and their safety and environmental impacts must be conducted during the EIA and the results and rationale for final design choices published in the EIA Study.

Problems with the EIA process

- **Technical Review Committee (TRC) members are drawn from the federal and provincial governments and the CNSC (Page 4), all supporters of the**

nuclear industry. The TRC must include experts independent of government and the nuclear industry, and to consult independent research to ensure a balanced, objective study.

See page 4-5 of this submission for a list of recommended studies, reports and articles.

- **Barriers to public participation in the EIA include lack of participant funding limiting the ability to hire experts, the short, mostly 30-day comment periods, and holding one in-person public meeting in one location during working hours.**

Questionable regulatory limits undermine public trust in the EIA

- **Regulatory limits of radioactive and non-radioactive contaminants may not be low enough to protect human health and the biosphere**. For example, levels of the mutation hazard, tritium, from the Point Lepreau Nuclear Generating Station are extremely high, yet are assessed by the CNSC as being well below regulatory limits.

Impacts on safety, public health and roads

- **Throughout the lifecycle of the project, especially during construction, monitor the impacts on housing supply, emergency response, health and social services,** as well as the effects of increased traffic and congestion, pollution, and accident risk, notably near schools, community centres, residences and businesses.

Recommended Studies, Reports and Articles on Small Modular Nuclear Reactors

National Academies of Sciences, Engineering, and Medicine. 2023. *Merits and Viability of Different Nuclear Fuel Cycles and Technology Options and the Waste Aspects of Advanced Nuclear Reactors*. Washington, DC: The National Academies Press. https://doi.org/10.17226/26500

Lyman, Edwin. 2021. *"Advanced" Isn't Always Better: Assessing the Safety, Security, and Environmental Impacts of Non-Light-Water Nuclear Reactors.* Cambridge, MA: Union of Concerned Scientists https://doi.org/10.47923/2021.14000

The World Nuclear Industry Status Report 2022 (V3–02/2023) A Mycle Schneider Consulting Project. Paris, October 2022 https://www.worldnuclearreport.org/-World-Nuclear-Industry-Status-Report-2022-.html

Ramana, M. V. 2021. "Small Modular and Advanced Nuclear Reactors: A Reality Check," in *IEEE Access*, vol. 9, pp. 42090-42099, doi: 10.1109/ACCESS.2021.3064948. https://ieeexplore.ieee.org/document/9374057

Krall, L., A. M. Macfarlane and R. C. Ewing. Nuclear waste from small modular reactors. PNAS Open Access, 2022 https://www.pnas.org/doi/10.1073/pnas.2111833119

Froese, S., N. C. Kunz, and M. V. Ramana. Too small to be viable? The potential market for small modular reactors in mining and remote communities in Canada, in **Energy Policy,** Volume 144, September 2020, 111587 https://www.sciencedirect.com/science/article/abs/pii/S030142152030327X?via%3Dihub

Sovacool, B.K., Schmid, P., Stirling, A. *et al.* Differences in carbon emissions reduction between countries pursuing renewable electricity versus nuclear power. *Nat Energy* **5**, 928–935 (2020). https://doi.org/10.1038/s41560-020-00696-3 https://www.nature.com/articles/s41560-020-00696-3#Abs1

Russo, A. et al, "Incidence of childhood leukemia before and after shut down of nuclear power plants in Germany in 2011: A population-based register study during 2004 to 2019" International Journal of Cancer. Vol. 152 Issue 5, March 1, 2023, pages 913-920 **https://onlinelibrary.wiley.com/doi/full/10.1002/ijc.34303**