

# REFLECTIONS ON THE INTERSECTION OF SUSTAINABILITY AND NUCLEAR SAFETY FROM A CANADIAN PUBLIC INTEREST PERSPECTIVE

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## Abstract

The intersection of sustainability and nuclear safety marks a potentially fruitful site for meaningful public discourse, decision-making, and policy development. This paper employs a Canadian public interest perspective to discuss these potential benefits as well as four conditions required to realize them. First, the author argues that any work to bridge sustainability and nuclear safety concerns should prioritize commitments to environmental justice. Here, environmental justice in the Canadian context is defined broadly to include observance of Indigenous law as well as attention to ensuring the benefits and costs of nuclear development are equitably distributed. Second, this paper proposes that any frameworks for assessing sustainability and nuclear safety should also facilitate greater interjurisdictional collaboration between Canadian federal and provincial governments as well as Indigenous governments and leadership. Third, the author argues that a regulatory focus on the impacts as well as the risks of nuclear energy facilities would help to illuminate the intersections of sustainability and nuclear safety in practical, real-world terms. And lastly, as joint considerations of sustainability and nuclear safety will require more holistic, complex, and comprehensive regulatory evaluations of projects and policies, this paper argues for robust and transparent public participatory processes to help frame and determine these evaluations.

## 1. INTRODUCTION

Joint considerations of sustainability and nuclear safety could have many benefits. This includes the potential to support more comprehensive and equitable nuclear regulation in a number of ways. It may invite more holistic regulatory approaches that recognize and respond to the full complexity of the interconnected human and non-human systems that nuclear regulation seeks to govern. It could also widen the field of criteria used to inform decision- and policy-making, resulting in potentially more equitable outcomes. However, *how* joint considerations of sustainability and nuclear safety are made will also determine the extent to which this potential is realized. This paper's Canadian public interest perspective indicates a primary concern for the wellbeing of diverse communities and civil society. However, the author hopes the observations and reflections in this paper may also prove of interest and benefit to those in other fields thinking through issues of sustainability and nuclear safety in other jurisdictions as well.

The remainder of this paper canvasses four conditions that may help give rise to the abovementioned benefits. In particular, the author argues that any work to bridge sustainability and nuclear safety should prioritize commitments to environmental justice. In practice, this would require observance of Indigenous law and governance, including Indigenous Peoples' definitions of what sustainability and nuclear safety would require. This first condition would also require the equitable distribution of costs and benefits associated with nuclear energy infrastructures. Here, considerations of racialization, gender, and socio-economic status would need to be centred in project and policy decisions. Second, frameworks for assessing sustainability and nuclear safety may need to facilitate greater interjurisdictional collaboration between Canadian federal and provincial governments as well as Indigenous governments and leadership. Third, a focus on the *impacts* as well as the *risks* of nuclear energy facilities could help to illuminate the intersections of sustainability and nuclear safety in practical, real-world terms. All nuclear infrastructure interacts with the ecologies and societies in which it is embedded. Focusing on these real and complex interactions will provide a stronger evidentiary foundation upon which joint considerations of sustainability and nuclear safety can be made in ways that are sensitive to local contexts. Finally, with the diversity, complexity, and interconnected nature of the factors that must be taken into account when considering sustainability and nuclear safety together, transparent and robust participatory public processes will be required to help to gauge local needs and ensure decisions are made with the unique environmental, social and economic contexts in mind.

## 2. CENTERING ENVIRONMENTAL JUSTICE

Any conceptual frameworks emerging from this conference, developed by the IAEA or Canada as a member state, relating to nuclear safety and sustainability should be supportive and conducive to Indigenous

Peoples' own laws and governance systems. Further, the definitions and conceptualizations of nuclear safety and sustainability as well as their goals and objectives should ensure consistency with existing Indigenous frameworks for managing their lands and waters. Indigenous Peoples throughout the world have been, and continue to be, disproportionately adversely impacted by nuclear infrastructures and technologies, including uranium mining and milling, experimental or test projects, fuel processing and electricity generating facilities, and all the wastes produced by each of these industries. Environmental justice should be a priority of future Canadian regulatory efforts to bridge nuclear safety and sustainability and these efforts must take care not to perpetuate neo-/colonial power dynamics. This is required by both Indigenous legal systems as well as multiple international declarations and domestic Canadian law.

Environmental justice analyses should also be sensitive to the racialization and socio-economic status of those involved with and impacted by nuclear energy infrastructure (including workers and those living in host communities), and include specific gender-based analysis as well. Environmental justice requires considerations of sustainability and nuclear safety to work to ensure the benefits and costs of nuclear development are distributed equitably.

## 2.1. Indigenous law, knowledge, and governance

Since time immemorial, Indigenous Peoples have governed the lands and waters Canada also claims. Before any European colonization or the subsequent Canadian confederation, Indigenous legal and governance systems emerged from each Peoples' unique and sacred relationships with their ancestral territories. Anishinabe scholar Deborah McGregor has explained how "Indigenous legal orders flow from Indigenous Peoples' own long-standing relationships to and understandings of the natural/spiritual world". [1] As a result, she notes that Indigenous Peoples are experts, based on thousands of years of accumulated and rigorous knowledge, on how to steward and manage their lands for their mutual wellbeing with the rest of Creation. By extension, McGregor warns against assumptions that international definitions of sustainability are automatically or inevitably compatible with Indigenous duties to the natural world. [2]

As with sustainability, definitions of nuclear safety need to similarly be made with reference to Indigenous Peoples' relationships and duties to their lands and waters. The control over routine environmental releases, including the setting of thresholds for permissible releases to the environment, should protect and support Indigenous Peoples' relations with potentially affected places. As Michif scholar Max Liboiron explains, the failure to do so in policy or practice is a foundational element of ongoing colonialism. [3] Similarly, this paper would argue that assumptions that go into modeling and predicting nuclear safety risks and determinations about their reasonableness should similarly be adopted subject to Indigenous laws and the standards that flow from these laws. Section 35 of the Canadian constitution requires that Canadian governments recognize and observe Indigenous Peoples' inherent rights, as well as the rights contained in Treaties with Indigenous nations. [4]

## 2.2. International declarations, Indigenous Peoples, and sustainability

In addition to Indigenous laws and their continued application to Indigenous Peoples' territories, multiple international legal instruments and declarations require observance of Indigenous legal and governance systems and the rights and responsibilities they include. The *United Nations' Declaration on the Rights of Indigenous Peoples (UNDRIP)* provides another international legal basis for centring Indigenous Peoples in any considerations of nuclear safety and sustainability. [5] The *Declaration* protects Indigenous self-determination, self-government, and their own "political, legal, economic, social and cultural institutions". [6] It recognizes Indigenous Peoples' rights to participate in decision-making processes as well as maintain their own processes [7] and that their "free prior, and informed consent" is required before legislative or administrative measures are implemented that could affect their rights. [8] Significantly, the *Declaration's* preamble also "[r]ecogniz[es] that respect for Indigenous knowledge, cultures and traditional practices contributes to sustainable and equitable development and proper management of the environment" and provides for Indigenous peoples to "maintain and develop their political, economic and social systems of institutions, to be secure in the enjoyment of their own means of subsistence and development, and to engage freely in all their traditional and other economic activities". [9] Various Canadian jurisdictions are currently in the process of implementing the *Declaration*, though their efficacy has yet to be proven. [10]

When discussing potential incompatibilities between Indigenous and UN definitions of sustainability, Deborah McGregor references the *Kari-Oca Declaration and Indigenous Peoples' Earth Charter* which was drafted as a response to the United Nations' definition of sustainability that emerged from the first Earth Summit in 1992. The *Kari-Oca Declaration* was affirmed and expanded more recently on its 20<sup>th</sup> anniversary to coincide the United Nations Conference on Sustainable Development in 2012 (Rio+20). [11] Both *Kari-Oca* Declarations offer significant critiques of the United Nations' definition of sustainability, particularly its conceptualization of balance between economic, environmental and social factors. More, specifically, they find this to be incompatible

with Indigenous signatories' duties to the natural world due to the UN definition's implicit protection of economic systems that have proven to be deleterious to their territories. McGregor uses this critique as an example of the need to "decolonize international instruments' assumptions about human to non-human relationships and needs", [12] an observation that would assist more equitable future work on sustainability in Canadian regulatory contexts as well.

### 2.3. An intersectional approach to environmental justice and equity

Recent international and Canadian moves to recognize a public right to a healthy environment further connect human rights frameworks with environmental ones. [13] These developments reinforce the necessity to center environmental justice in considerations of sustainability and nuclear safety. Environmental justice analyses would be most successful if they were conducted both at broader policy levels as well as the local, project-specific level. Further, these analyses should explicitly address issues involving the Indigeneity, racialization, and income of those who would be involved with and potentially impacted by nuclear energy infrastructure, including nuclear workers and those living in host communities. Environmental justice assessments should also feature gender-based analyses to assess the safety, sustainability, and desirability of nuclear energy in communities.

## 3. ENABLING INTERJURISDICTIONAL COLLABORATION

Interjurisdictional cooperation will likely be required between Canadian federal and provincial governments and Indigenous governments to enable the joint consideration of sustainability and nuclear safety. In the Canadian regulatory context, nuclear safety has tended to be a legislated focus for federal project-specific nuclear energy decision-making processes. Sustainability, however, has tended to figure more prominently in provincial energy planning processes and policy making. Both project-specific and energy planning processes have their own distinct procedures for public involvement. However, except in the case of impact assessments, federal and provincial legislative regimes differentiate nuclear safety and sustainability to such an extent that it is challenging to meaningfully address both together in any public forum. Cooperative- and Treaty federalism may provide potential templates for greater interjurisdictional cooperation between governments.

### 3.1. The Canadian legislative context

The Canadian state is a federation with one federal, ten provincial, and three territorial governments whose respective heads of power are delineated in the Canadian Constitution. [14] When nuclear technologies first emerged, the Canadian federal government assumed primary jurisdiction over their regulation and development. This has continued to the present day where, in effect, the federal government is recognized as the primary Canadian regulator of nuclear infrastructure. The main focus of federal nuclear energy regulation is safety. This is evidenced in the name of Canada's primary regulatory agency: Canadian Nuclear Safety Commission (CNSC). The first half of the CNSC's mandate is to "regulate the development, production and use of nuclear energy... to prevent unreasonable risk to the environment and to the health and safety of persons... [and] prevent unreasonable risk to national security" and ensure compliance with the "international obligations to which Canada has agreed". [15] Significantly, this mandate does not include sustainability, and the CNSC cannot weigh in on questions relating to energy supply. As such, the Commission tends to defer to determinations made by the provinces on that issue.

Meanwhile, provincial governments have jurisdiction over electricity prices and determining supply mixes via provincial ministerial plans and utility commissions and boards. The majority of nuclear energy facilities (both nuclear fuel processing facilities, power plants, and nuclear waste facilities) are located on Anishinabe homelands also claimed by the province of Ontario, where periodic energy plans have been subject to varying degrees of public intervention. [16] Ostensibly, these plans have been concerned with matters of sustainability, however their respective sustainability assessments have varied in their rigour. Provinces tend to defer to the CNSC to determine issues relating to nuclear safety.

Significantly, the uranium mines and mills that power Ontario facilities are located on Dene lands also claimed by the province of Saskatchewan. There are no provincial or federal mechanisms by which the mining, processing, and generating activities can be considered together – either in terms of their sustainability or safety – further siloing contingent nuclear processes and limiting opportunities to consider them holistically in their interconnection. These geographic jurisdictional distinctions further stratify the many considerations at play in any given decision-making process.

The one legislated circumstance in which sustainability can be considered alongside safety is in impact assessments for nuclear projects. The current *Impact Assessment Act* (and previous *Canadian Environmental Assessment Act, 2012* to a lesser extent) provided a legislated basis for considering sustainability alongside those of environmental impacts and safety for nuclear facilities. [17] However, the ability of impact assessments in and

of themselves to bridge the abovementioned legislative gap is limited. While impact assessments require an evaluation of underlying needs for and alternatives to the assessed project, in practice these analyses tend to be very narrowly construed in efforts to avoid re-litigating established provincial electricity supply policy. Further, impact assessments are conducted fairly infrequently, for example, only at the start of a multi-decade-long project.

The legislative background above is meant to illustrate the institutional challenges for joint considerations of safety and sustainability in the Canadian regulatory context. Currently, members of the public and public interest organizations hoping to promote holistic considerations of nuclear infrastructure that include safety and sustainability can expect to be told such submissions are “out of scope” by each respective Canadian regulatory authority.

### 3.2. Cooperative and Treaty-federalism

Dayna Scott has observed that what she calls the ‘legal, social, and political contestations of jurisdiction’ have “ecological and environmental health consequences”. [18] Which, she continues, “is not to say that these consequences could be erased with a clear division of powers or singular jurisdiction in charge of regulating “the environment”; [rather] it is to emphasize that the particular contours of the legal and political mobilizations needed to achieve change are structured by the constitutional configuration”. [19] Her observation is constructive for thinking through the interjurisdictional nature of sustainability and nuclear safety considerations that affect the nuclear sector and its regulation. Maintaining tight restrictions and distinctions between governments’ respective spheres of claimed jurisdiction create sharp and angular contours that can pose obstacles for the public mobilization required to contribute to equitable and comprehensive regulation.

Greater cooperative federalism between federal and provincial Canadian governments may soften some of these edges, [20] but would require both levels of government to have shared interests in jointly considering sustainability and nuclear safety. [21] In practice, this may be challenging. Further, interjurisdictional consideration of sustainability and nuclear safety require Indigenous leadership to be able to exercise decision-making power at least on-par with Canadian governments. Treaty federalism, which recognizes three heads of power: Indigenous, federal, and provincial, may be one way to assist and ensure more equitable power relationships between Canadian and Indigenous governments. [22] However, this model may not be universally applicable for ordering all Indigenous Nations’ relationships with Canadian federal and provincial governments.

## 4. AUGMENTING RISK-INFORMED PRACTICES WITH IMPACT-BASED ONES

Bridging nuclear safety and sustainability considerations could be served by augmenting risk-informed approaches to include more reliance on impact-based approaches in both nuclear regulation as well as public communications relating to nuclear projects and facilities. All nuclear infrastructure – whether uranium mines, decommissioning or remediation projects, or operating facilities – interacts with the ecologies and societies in which they are necessarily embedded. The electricity and employment opportunities they provide, the contaminants they release, the building materials and equipment they use and must eventually decommission, their wastes: aside from their risks there are daily impacts that can and should be measured and transparently reported. Developing robust understandings of all these interactions in real life through detailed monitoring and observation can promote more informed and thus holistic and comprehensive regulation and public interventions. This augmented approach, requiring monitoring to augment and verify the more commonly-used risk-based modelling, also has the potential to facilitate greater regulatory and public awareness of the many ways in which nuclear safety and sustainability already intersect, and ways this can be better recognized in applicable regulation.

### 4.1. Risk-informed and impact-based approaches to regulation

Risk-informed regulation has come to characterize much of Canadian government and international agency oversight of the nuclear sector. This approach is evident in the reliance on periodic probabilistic safety assessments, modelling practices to predict radiation exposures, and uses of risk assessments to allocate agency funding and determine best uses of regulatory staff time. [23] In Canadian legislation, the first half of the CNSC’s mandate, discussed above, refers almost exclusively to risk and “risk” language permeates the entire Canadian *Nuclear Safety and Control Act*. [24] Licences for nuclear facilities and projects can only be granted if they are not found to “pose an unreasonable risk to the environment, the health and safety of persons, or national security”. [25]

The substantive regulatory focus on risk also permeates approaches to public communication by nuclear agencies. While, the IAEA Statute requires the Agency to “[f]oster the exchange of scientific and technical information on peaceful uses of atomic energy”, [26] the Agency has developed the most guidance for risk communication, a primary focus in its Nuclear Communicator’s Toolbox. [27] Canadian legislation and regulations similarly require the CNSC to share nuclear-related information, and this is primarily undertaken

according to risk-based criteria. The second part of the CNSC’s mandate requires it to “disseminate objective scientific, technical and regulatory information to the public concerning the activities of the Commission and the effects, on the environment and on the health and safety of persons, of the development, production, possession and use”. The regulations that specify how the Commission is to meet this mandate, however, emphasize the importance of risk communication. For example, risks are central in REGDOC 3.2.1 which requires nuclear facilities to have public information programs that are;

“commensurate with the public’s perception of risk and the level of public interest in the licensed activities, which may be influenced by the complexity of the nuclear facility’s lifecycle and activities, and the risks to public health and safety and the environment perceived to be associated with the facility and activities. [28]

While it is important to recognize potential benefits of risk-informed regulatory and communications approaches, including their ability to address contingent and unknown future conditions, risk is not always the best lens by which to gain a comprehensive understanding of nuclear energy. The theoretical basis for risk-based approaches should be complemented by information and data that measures real-life impacts wherever possible. When conducted transparently, verified with real data, and finalized with public input, risk-informed approaches can help regulators and the public to understand current conditions as well as potential future ones.

Assessments of both sustainability and nuclear safety would be best supported by risk-informed and impact-based approaches. While risk-informed approaches continue to constitute a focus for regulators and will likely be discussed by others at this conference, the value of impact-focused work is illustrated further in the case study below.

#### 4.3. Case study: the Nuclear Transparency Project and work that focuses on impacts over risks

The Nuclear Transparency Project (NTP) was founded in 2020 as a Canadian non-profit organization “dedicated to supporting open, informed, and equitable public discourse and decision-making about nuclear energy”. [29] The organization advocates for the release of raw data relating to the measured impacts of nuclear facilities in the ecological, social, and economic systems in which they are embedded. Practically, this includes advocacy efforts to push for fulsome releases of environmental data by nuclear licensees and operators. Such data includes sampling results from liquid effluent releases to surface water and sewers, gaseous releases to air, groundwater contaminant plumes, and any measured impacts by nuclear facilities to aquatic and terrestrial species and habitat. NTP also requests access to social data such as demographic information characterizing nuclear workforces and nuclear host communities as well as any results of public opinion surveys which are routinely conducted by nuclear facilities. To support greater financial transparency, NTP engages with nuclear regulators to better understand their oversight of licensees’ financial guarantees and liability coverage. Many Crown corporations that own and operate nuclear facilities already regularly report financial earnings and savings to the public. NTP is beginning to analyse this data as well as advocate for private owners and operators of other nuclear facilities to adopt similar financial disclosure practices. The organization makes recommendations for ways to promote greater transparency via regular submissions during regulatory processes before the CNSC and Natural Resources Canada. [30] and as a member organization of working groups and a stakeholder forum with various federal regulators concerned with public access to information and data. [31]

NTP has a network of subject matter-specific contributors who conduct research and provide analysis on received and publicly posted data, with the hope that this work can support members of the public in better understanding and arriving at informed opinions relating to nuclear energy infrastructure and its regulation. Through greater access data, NTP contributors are able to assess facility- and place-specific trends in environmental performance as well as larger regional trends in the environmental impacts of different types of nuclear infrastructure. The environmental data NTP works with has also helped to identify potential knowledge gaps relating to routine and non-routine emissions from nuclear facilities and projects, supporting potential moves toward more comprehensive regulation on matters of nuclear safety. Further, comparing environmental, social, and financial data facilitate observations relating to sustainability and any emerging signs of (in)equities relating to how the benefits and costs of Canadian nuclear energy infrastructure are proportioned. In this way, attention to real-world conditions, in addition to calculations and perceptions of risk, can meaningfully contribute to evaluations of sustainability and safety in the nuclear sector.

## 5. BEST PRACTICES FOR SUPPORTING PUBLIC PARTICIPATION

Joint considerations of sustainability and nuclear safety will require evaluations of diverse, complex, and interconnected factors. Public input can assist authorities’ efforts to gauge local needs and understand the unique and embedded constellations of risks and impacts involved in nuclear energy infrastructures and policies.

In order for decision-making processes to be meaningful, certain procedural and substantive components are required. The *Convention on access to information, public participation in decision-making and access to*

*justice in environmental matters* (the “Aarhus Convention”) provides a good reference point for the most basic requirements, namely: access to information, [32] public participation, [33] and access to justice such as the opportunity to judicially review concerning decisions. [34] These same three principles have been built upon subsequently in the 2018 *Regional agreement on access to information, public participation and access to justice in environmental matters in Latin America and the Caribbean* (the “Escasú Agreement”), where the protocol adds the need to ensure an “enabling environment” for those working to realize “human rights in environmental matters”. [35] The Escasú Agreement also contains provisions to support capacity-building for all parties [36] and require cooperation between parties that recognize their varying privileges. [37] These additional provisions permit greater attention to be paid in participatory processes (both procedurally and substantively) to matters of environmental (in)justice. Finally, the *Kari Oca 2 Declaration* calls for explicit measures to ensure Indigenous Peoples’ “full, formal and effective” and “active participation in decision making processes affecting them”, [38] requirements echoed in *UNDRIP*. All these international sources provide guidance on best practices that would likely be of assistance in ensuring joint considerations of nuclear safety and sustainability achieve more equitable and informed outcomes.

In addition to the above, decision-making authorities should also negotiate reasonable processes and timelines for public interventions with members of the public and public interest organizations. This would help provide for sufficient time to allow for information requests to be made and for information to be received and analysed in order to ensure submissions are properly informed. Further, if capacity funding is provided in a given process, determinations of financial support should be clearly explained and transparent.

## 6. CONCLUSION

This paper canvassed some potential benefits of the joint consideration of nuclear safety and sustainability and provided four broad conditions required to help give rise to these benefits. The author relied on a Canadian public interest perspective and argued first, that any use of sustainability as a concept or framework should further environmental justice and support Indigenous Peoples’ responsibilities to the natural world in line with their legal and governance systems. This paper then addressed the need for interjurisdictional collaboration between provincial, federal, and Indigenous jurisdictions in the joint consideration of safety and sustainability. Third, the author advocated for an impact-based approach to examining sustainability and nuclear safety rather than relying exclusively on a risk-informed approach. And lastly, several best practices for transparent and fully participatory public processes were canvassed.

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- [16] The high-water mark for participatory energy planning was set with the 1992 Demand/Supply Plan and 2006 Integrated Power System Plan public consultations and hearings. More recent Long-term Energy Plans and Discussion papers have provided more limited opportunities for written public comment only.
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