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Embedding Sustainability in Canadian Defence
Policy: Implications for Military Security

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On The Cover

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“Canadian Forces School of Search and Rescue course 49 Arctic Survival Phase”

Corporal Josh Terry, student of Canadian Forces School of Search and Rescue Course 49, lifts a snow block inside his igloo during the arctic survival phase in Crystal City, Nunavut on February 16, 2016.

Photo: Corporal Pierre J. Létourneau, 19 Wing Imaging

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Abstract

Canada's defence policy is being transformed by generational investment in force modernization, intensifying Arctic geopolitical competition, and the operational and infrastructure demands of climate change. These pressures are already affecting the readiness and long-term viability of Canada's military. While recent government strategies increasingly acknowledge climate-related risks and security implications, sustainability remains insufficiently integrated into defence planning, procurement systems, and capability development. This creates a growing risk that major defence investments will be undermined by environmental instability, rising operational demands, and infrastructure degradation. This policy paper argues that sustainability must be treated as a core determinant of Canada's military effectiveness, sovereignty, and strategic credibility. It demonstrates that existing approaches remain fragmented and do not adequately align federal environmental and climate policy objectives with defence priorities. The paper identifies key structural gaps and proposes actionable policy measures to integrate sustainability into capability development, strengthen climate-resilient Arctic infrastructure, reform procurement systems, and institutionalize sustainability within defence governance. Embedding sustainability into defence planning is essential to ensure that Canada's military remains operationally effective and strategically credible in an increasingly climate-disrupted security environment.

Introduction

Canada's defence policy is entering a period of structural transformation. Climate change is already reshaping the operational environment of the Canadian Armed Forces (CAF), particularly through increasing domestic deployments, infrastructure degradation, and rapidly changing Arctic conditions. At the same time, Canada is undertaking some of its largest defence investments in decades, including the modernization of North American aerospace defence systems and expanded Arctic capabilities. These developments are closely interconnected. Federal assessments show that climate-related hazards, including flooding, wildfires, permafrost degradation, and extreme weather, are already affecting defence infrastructure, operational readiness, and resource allocation, while rising domestic demand for disaster response is placing additional strain on personnel and force availability.¹

Environmental change increasingly affects military effectiveness and security outcomes,² including in the Canadian context.³ Climate-induced disruptions can influence conflict dynamics and patterns of instability.⁴ Environmental pressures can also intensify institutional fragility and geopolitical tensions.⁵ At the same time, military activities themselves generate ecological impacts that increasingly interact with broader environmental challenges.⁶ Sustainability therefore affects core dimensions of military effectiveness by shaping infrastructure resilience and long-term capability generation.⁷ It also exposes vulnerabilities linked to energy dependence and global supply chains.⁸ Furthermore, sustainability is becoming an important factor shaping the societal

legitimacy conditions under which military institutions operate.⁹

Taken together, these insights indicate that sustainability is not an external consideration but a factor that directly shapes how military power is generated, maintained, and justified. However, these implications are not yet fully reflected in Canadian defence policy, particularly regarding capability development, Arctic infrastructure planning, defence procurement, and sustainability governance. This policy paper argues that sustainability must therefore be treated as a core determinant of Canadian military security, understood here as the ability of the CAF to generate, sustain, and employ military capabilities over time. It applies a structured analytical approach to assess how sustainability affects long-term force viability, organizational resilience, and institutional legitimacy in the context of Canadian defence policy. On this basis, the paper identifies four key policy gaps: the absence of sustainability criteria in capability development, insufficient climate-resilient standards for Arctic infrastructure, limited integration of sustainability into defence procurement, and fragmented institutional governance. It then outlines concrete policy measures to address these shortcomings. While climate change also affects broader dimensions of national security, this paper focuses on military security to analyse how environmental factors shape the capabilities and operations of the armed forces.

Climate-related operational demands, military emissions, and infrastructure vulnerability are increasingly recognized as important challenges for Canadian defence policy.¹⁰ However, sustainability remains insufficiently integrated into key areas of

defence policy, including capability development, procurement, infrastructure planning, and institutional governance. This paper examines these policy gaps and proposes concrete policy measures to strengthen the long-term resilience and effectiveness of the CAF.

Conceptualizing Sustainability in Defence Policy

Sustainability is commonly understood as meeting present needs without compromising the ability of future generations to meet their own needs.¹¹ Building on this definition, sustainability is conceptualized here in the context of defence policy as a multidimensional factor shaping the long-term viability and effectiveness of military capability. In this context, sustainability encompasses three interrelated dimensions: the environmental impacts of military activities, including greenhouse gas emissions production and resource use; the effects of climate change on military effectiveness, particularly infrastructure resilience and operational readiness; and the growing importance of environmental responsibility for the legitimacy of military institutions.

Military security refers to the ability of a state to generate and employ military capabilities to protect national interests and ensure readiness.¹² Building on this understanding, this paper conceptualizes military security as the capacity of armed forces to generate, sustain, and effectively deploy military capability over time. This includes not only operational readiness and force availability, but also the resilience of supporting infrastructure, supply systems, and institutional legitimacy under changing environmental conditions.

Taken together, sustainability can be viewed as a structural condition that shapes how military power can be generated, maintained, and deployed over time. This definition provides the analytical lens for the following policy assessment, which evaluates the extent to which Canadian defence policies integrate sustainability into capability development, procurement, and long-term planning.

Canada's Evolving Strategic Environment

Canada's strategic environment has undergone significant transformation over the past decade as climate change, shifting geopolitical dynamics, and rapid technological advancement reshape national defence priorities.¹³ Recent federal assessments identify climate change, intensifying global competition, and accelerated innovation in military-relevant technologies as the most consequential drivers influencing defence planning.¹⁴ Nowhere are these dynamics more pronounced than in the Arctic, where warming proceeds several times faster than the global average, producing profound environmental and infrastructural impacts with direct implications for national defence.¹⁵ These developments challenge longstanding assumptions of continental security and place growing demands on the CAF.

Accelerating climate related hazards, including flooding, wildfires, permafrost degradation, coastal erosion, and extreme weather, already constrain military infrastructure and operations.

Federal assessments confirm that such hazards are affecting defence infrastructure and operational readiness, while scientific analyses highlight escalating risks to

northern transportation corridors, energy systems, and defence installations because of thawing permafrost and unstable ground conditions.¹⁶

At the same time, rising domestic disaster-response requirements are placing sustained pressure on personnel availability, readiness, and resource allocation.¹⁷ Climate change is also increasing demands for domestic operations, particularly disaster response missions such as Operation LENTUS, placing pressure on personnel and readiness.

of-government sustainability directives, reinforcing the need for integrated and forward-looking defence planning.¹⁹

Figure 1 displays Canada's military expenditure from 1960 to 2024 in constant 2023 US dollars based on the SIPRI Military Expenditure Database.²⁰ Expressing defence spending in inflation-adjusted terms ensures comparability over time and explains why the values shown are lower than nominal expenditure figures reported in current prices or national currency. In real terms, Canadian defence spending amounted to just under 30 billion USD in 2024.

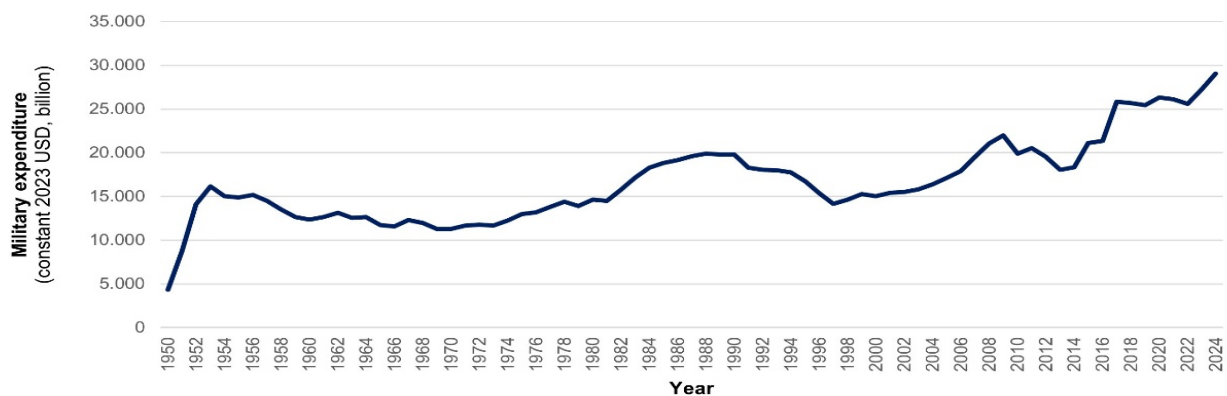


Figure 1: Canada's Military Expenditure, 1960–2024 (constant 2023 USD), own illustration using data from SIPRI Military Expenditure Database

At the same time, changing Arctic conditions are reshaping the strategic environment, while the binational nature of North American defence adds complexity to climate-related planning.

Parallel to these environmental developments, Canada has embarked on major investments to modernize North American aerospace and maritime defence systems, including upgrades to detection, surveillance, communications, and basing infrastructure across the Arctic and sub-Arctic.¹⁸ These efforts intersect with several developing federal frameworks, including national Arctic policy and whole-

Sustainability considerations have become more visible in Canadian defence policy. Recent strategic documents identify climate impacts as a national security issue and outline commitments to net-zero operations, climate-resilient infrastructure, and sustainable procurement practices.²¹ At the same time, the geopolitical environment confronting Canada has grown increasingly complex, with intensified major-power competition in the circumpolar region posing challenges to sovereignty, situational awareness, and infrastructure protection.²² Policy analysis cautions that these pressures are likely to increase as

climate change alters patterns of Arctic accessibility while simultaneously creating new challenges for navigation, infrastructure resilience, and military operations amid persistent capability gaps and fiscal constraints.²³

Taken together, these developments demonstrate that sustainability is not an external constraint but a central dimension of Canadian military security. Understanding how sustainability intersects with defence planning is therefore essential for navigating Canada's evolving strategic environment.

How Sustainability Reconfigures Military Security

Environmental change, resource dependencies, and evolving societal expectations increasingly affect how military capabilities are generated, sustained, and legitimized.²⁴ To analyse these dynamics, this paper adopts a framework identifying three mechanisms through which sustainability reconfigures military security: temporal, organizational, and normative reconfiguration.²⁵ Together, these mechanisms help explain why sustainability has become an increasingly important dimension of contemporary military security.

Temporal reconfiguration shifts security thinking from short-term readiness toward long-term viability. While traditional military security emphasizes immediate threats and rapid force deployment,²⁶ modern armed forces depend on energy-intensive infrastructures and resource-dependent supply chains that are increasingly vulnerable to climate-driven disruption. Carbon-intensive systems create structural path dependencies that constrain future operational choices and amplify long-term risk.²⁷ Sustainability therefore

expands the temporal horizon of security by foregrounding infrastructure durability, energy transitions, and future capability under degrading environmental conditions.²⁸ These dynamics are particularly pronounced in regions already experiencing climate induced infrastructure instability, such as the circumpolar North.²⁹

Organizational reconfiguration concerns how sustainability alters institutional design, logistics, procurement, and adaptability. Whereas traditional defence approaches privilege force structure and command hierarchies, sustainability shifts attention toward resilience, supply-chain diversification, and institutional learning.³⁰ Organizational flexibility and innovation capacity are critical for effectiveness under environmental stress.³¹ Sustainability-oriented reforms, including energy-efficient infrastructure, decentralized energy systems, and circular procurement practices, therefore enhance institutional robustness and align with emerging defence strategies focused on climate adaptation and resilience.³²

Normative reconfiguration captures changing societal expectations and legitimacy conditions surrounding military institutions. Military effectiveness depends not only on capability but also on public acceptance and political authorization.³³ As environmental responsibility, transparency, and intergenerational accountability gain prominence, militaries face growing scrutiny regarding emissions, resource use, and ecological impact. Scholarship on climate-military relations shows that environmental stewardship increasingly shapes institutional credibility and legitimacy.³⁴ Whole-of-government sustainability frameworks further institutionalize these expectations by embedding climate

responsibility within public-sector governance, including defence.³⁵ Public perceptions of the environmental impact of military activities, particularly emissions and land use, are likely to become an increasingly important factor shaping military legitimacy.

Taken together, temporal, organizational, and normative reconfiguration illustrate how sustainability transforms the practice and meaning of military security. Rather than displacing traditional security imperatives, sustainability complements them by reducing vulnerability, enhancing resilience, and strengthening institutional legitimacy. This framework provides the conceptual foundation for evaluating Canada's defence policies and identifying pathways for integrating sustainability into long-term security planning.

Assessment of Existing Canadian Defence and Sustainability Policies

Canada's defence sustainability policy landscape is rich in initiatives but remains structurally fragmented. Sustainability is increasingly acknowledged across major defence and federal policy frameworks, yet it is not systematically integrated into force development, procurement, infrastructure investment, and institutional governance. As a result, climate-related policy commitments and defence planning often remain disconnected. The central challenge is that no integrative framework currently positions sustainability as a foundational element of Canada's defence posture.

This fragmentation is partly rooted in the complex policy environment within which defence sustainability is governed. In addition to policies issued by the Department of National Defence (DND) and the CAF,

government-wide frameworks shape sustainability objectives, emissions reduction efforts, and reporting requirements across the federal administration. Key frameworks include the Federal Sustainable Development Strategy (2026),³⁶ the Departmental Sustainable Development Strategy 2023–2027 (2025),³⁷ and the 2030 Emissions Reduction Plan (2022).³⁸ Together, these frameworks provide the strategic and regulatory context that informs defence planning, governance, and implementation.

Canada's 2017 defence policy *Strong, Secure, Engaged* (SSE) established the long-term foundations for force development, procurement, and personnel expansion, but its treatment of sustainability reflects the conceptual boundaries of an earlier strategic era. SSE largely frames climate change as an external contextual challenge rather than as a structural determinant shaping capability development, operational readiness, or long-term force viability.³⁹ Subsequent analyses show that this approach limited preparedness for environmental change as a driver of military vulnerability, contributing to gaps in infrastructure resilience, basing, and logistics, particularly in northern regions where climate impacts escalated more rapidly than anticipated.⁴⁰

The 2024 defence policy *Our North, Strong and Free* (ONSAF) marks a substantive shift by explicitly identifying climate change as a destabilizing force transforming the physical, operational, and geopolitical environment of the Canadian North.⁴¹ While the policy acknowledges accelerated warming, changing patterns of Arctic accessibility, and heightened strategic competition, its responses remain

primarily oriented toward capability acquisition and force expansion. As a result, climate change is recognized as a threat, but sustainability is not embedded as a strategic principle governing defence planning, procurement, or logistics.⁴²

Canada's 2023 NORAD Modernization Plan represents the most consequential test of whether sustainability can be integrated into Canada's evolving defence posture. The modernization agenda envisages substantial investments in radar systems, digital command architectures, and northern operating locations, yet Arctic infrastructure is already experiencing severe environmental stress linked to permafrost degradation, coastal erosion, and hydrological change.⁴³ Analyses of environmental damage associated with contemporary conflict further underscore the risks facing militaries operating under unstable ecological conditions. Northern environmental assessments indicate that without binding sustainability criteria, including climate-resilient materials and low-carbon energy systems, modernization efforts risk reinforcing existing vulnerabilities.⁴⁴ The Defence Climate and Sustainability Strategy 2023–2027 (DCSS) represents an important step toward institutionalizing environmental governance by outlining emissions reduction targets, sustainable procurement objectives, and climate-risk assessments for infrastructure. However, the strategy remains principally procedural and does not establish sustainability as a determinant of capability design, readiness planning, or force development, nor does it ensure that major investment programmes are systematically shaped by sustainability considerations.⁴⁵

The 2023 Climate Resilience and Environmental Sustainability Science &

Technology Strategy (CRESST) complements DCSS by setting research priorities for adaptation, mitigation, and sustainable capability development. It emphasizes the need for resilient materials, energy systems, and operational concepts adapted to extreme environments. However, research-to-capability pathways remain fragmented, and without alignment to procurement reform or long-term investment planning, much of this technological potential risk remaining siloed within research units rather than shaping defence transformation.⁴⁶

The 2022 Greening Government Strategy (GGS) further outlines federal commitments to net-zero operations, low-carbon procurement, waste reduction, and climate-resilient infrastructure. Yet applying GGS to defence remains uniquely complex. Militaries are structurally different from other federal institutions: they operate in remote areas, maintain energy-intensive fleets, require specialized materials, and depend on robust logistical infrastructures. Guidance on how these sustainability directives should be operationalized for defence remains limited, and defence-specific pathways for implementation remain underdeveloped.⁴⁷

Taken together, the assessment demonstrates that Canada's defence policies increasingly recognize sustainability challenges but do not yet integrate sustainability systematically into force development, procurement, infrastructure planning, and governance. The absence of an overarching integrative framework risks leaving major defence investments vulnerable to environmental instability, logistical fragility, and accelerating climate impacts.

Policy Recommendations for Integrating Sustainability into Canadian Defence Planning

Developing effective policy options for Canada requires reframing sustainability as a strategic determinant of military capability, institutional resilience, and long-term operational viability. Although federal departments have introduced climate-related policy instruments in recent years, these initiatives remain fragmented and are not yet integrated into a coherent defence strategy. International assessments of climate–security interactions increasingly demonstrate that armed forces must adapt to rapidly changing ecological conditions that shape basing, logistics, procurement, and readiness.⁴⁸ To address these structural gaps, the following policy recommendations translate the analytical framework into concrete measures for strengthening the alignment between sustainability and Canadian defence planning.

1. Integrate Sustainability into Defence Capability Development

The Department of National Defence, in coordination with the Treasury Board of Canada, should require that all major defence capability and infrastructure projects incorporate binding sustainability and climate-risk criteria at the approval stage.

At present, sustainability considerations are addressed primarily through high-level strategies but are not systematically embedded in capability development or capital investment decisions. This creates a structural gap between policy commitments and defence outcomes, particularly in the context of large-scale investments in Arctic

infrastructure and continental defence modernization. Evidence from defence cost and fuel-use analysis shows that postponing sustainability integration at early planning stages increases long-term financial exposure and constrains operational viability.⁴⁹ To address this gap, the Treasury Board should amend its project approval requirements to mandate:

- Climate-risk assessments for all major capital projects
- Lifecycle costing models that include environmental and operational risks
- Sustainability performance criteria in project evaluation and procurement documentation

These requirements should be formally integrated into the Defence Investment Plan and applied to all projects above a defined financial threshold. Scientific assessments of the Arctic region demonstrate that permafrost degradation, ground subsidence, and shifting hydrological conditions increasingly undermine the long-term stability of northern operating locations, underscoring the necessity of binding climate-risk screening within capability development processes.⁵⁰

Implementation can build on existing frameworks, particularly the Defence Climate and Sustainability Strategy, but must move beyond reporting requirements toward enforceable decision criteria. The Department of National Defence should issue updated internal guidance to ensure that sustainability metrics are incorporated consistently across capability development processes.

Key obstacles include increased upfront costs, longer approval timelines, and interoperability constraints with allied systems, particularly those of the United States. However, failing to integrate sustainability at the approval stage risks locking Canada into defence capabilities that may not remain operationally viable under future environmental conditions.

Embedding sustainability into capability development would improve infrastructure durability, reduce lifecycle costs, and enhance operational readiness, particularly in climate-sensitive regions such as the Arctic.

2. Establish Binding Climate-Resilient Standards for Arctic Defence Infrastructure

The Department of National Defence, in partnership with Infrastructure Canada, should establish and enforce binding standards for climate-resilient defence infrastructure in the Arctic.

Northern defence infrastructure is increasingly exposed to permafrost degradation, coastal erosion, and extreme weather conditions, all of which directly threaten the long-term viability of military installations and logistics networks. Infrastructure assessments consistently show that resilient design principles, including adaptive foundations, energy-resilient systems, and climate-responsive monitoring, are essential for maintaining operational continuity in Arctic environments.⁵¹ Current infrastructure investments do not consistently apply climate-resilient design principles, creating risks of operational disruption and long-term cost escalation. To address these risks, the federal government should develop a dedicated

Arctic defence infrastructure framework that mandates:

- Permafrost-adapted engineering and foundation standards
- The use of climate-resilient construction materials
- Integration of renewable and hybrid energy systems, including microgrids
- Continuous environmental monitoring systems embedded in infrastructure design

These standards should be applied to all new and upgraded defence infrastructure in northern regions, including forward operating locations and installations associated with continental defence modernization.

Implementation should include formalized mechanisms for consultation and partnership with Indigenous communities, recognizing that structured engagement and the integration of Indigenous knowledge are critical for ensuring infrastructure suitability, environmental stewardship, and long-term local acceptance.⁵²

Key obstacles include high construction costs, logistical constraints in remote regions, and limited availability of specialized engineering capacity. However, these challenges are outweighed by the risks of infrastructure failure, operational disruption, and significantly higher long-term repair and replacement costs.

Establishing binding standards would enhance the reliability of Arctic operations, protect critical defence assets, and ensure that major investments remain viable under rapidly changing environmental conditions.

3. Reform Defence Procurement to Prioritize Sustainability and Supply-Chain Resilience

Public Services and Procurement Canada, in coordination with the Department of National Defence and the Treasury Board of Canada, should reform defence procurement processes to prioritize lifecycle sustainability and supply-chain resilience.

Current procurement frameworks remain primarily focused on acquisition costs and immediate performance requirements, with limited integration of long-term environmental and logistical risks. This approach is increasingly unsustainable in a context of climate disruption, resource constraints, and global supply-chain volatility.⁵³ Defence procurement research demonstrates that integrating sustainability criteria, including modularity, repairability, energy efficiency, and circular-economy principles, can strengthen readiness while reducing lifecycle vulnerability. Procurement reform should introduce:

- Lifecycle-based evaluation criteria that account for maintenance, energy consumption, emissions, and total cost of ownership
- Mandatory requirements for modular, repairable, and upgradable system design
- Sustainability and resilience criteria in contractor selection and bid evaluation
- Incentives for suppliers that demonstrate low-carbon production and secure, diversified supply chains

These changes should be implemented through updates to Treasury Board

contracting policies and integrated into existing frameworks such as Industrial and Technological Benefits requirements.

Key obstacles include resistance from established defence contractors, higher initial procurement costs, and interoperability constraints with allied systems. In addition, transitioning to new procurement criteria may require adjustments to existing contracting processes and evaluation capabilities within government.

Despite these challenges, aligning procurement with sustainability objectives would reduce long-term operational costs, strengthen supply-chain resilience, and improve the reliability of defence systems under conditions of environmental and geopolitical uncertainty.

4. Establish a Central Defence Sustainability Governance Unit

The Department of National Defence should establish a centralized sustainability governance unit at the senior executive level to coordinate and enforce the integration of sustainability across defence policy, planning, and investment.

At present, responsibilities for climate and sustainability are distributed across multiple policy, infrastructure, and operational units. This fragmentation limits coherence, reduces accountability, and makes it difficult to align sustainability objectives with major defence investments and strategic priorities. The Research Community REN21 consistently shows that defence institutions struggle with fragmented responsibilities and weak integration between strategic planning, operational policy, and national climate

frameworks.⁵⁴ To address this, the Department of National Defence should create a dedicated unit with a mandate to:

- Oversee the integration of climate risk and sustainability into defence decision-making processes
- Coordinate across internal departments and with external actors, including Environment and Climate Change Canada and the Treasury Board
- Review and assess major capital projects for alignment with sustainability objectives
- Monitor implementation and report on progress across defence programs

Emerging international governance frameworks demonstrate that dedicated sustainability authorities within defence ministries can harmonize environmental objectives with military requirements, strengthen cross-government coordination, and ensure that climate risks are systematically integrated into major defence investments.⁵⁵

The unit should be positioned at the assistant deputy minister level or equivalent to ensure influence over strategic planning and investment decisions. Comparative analysis of institutional reform across government systems indicates that centralized governance structures with clear mandates improve policy coherence, accountability, and long-term institutional resilience, particularly in complex policy domains such as climate and security.⁵⁶ Key obstacles include bureaucratic resistance, potential mandate overlap, and the challenge of integrating new governance structures into existing processes. Clear authority, defined responsibilities, and

strong political support will be required to ensure effectiveness.

Establishing a centralized governance unit would improve policy coherence, strengthen accountability, and ensure that sustainability considerations are consistently integrated into defence planning and investment decisions.

Conclusion

This paper shows that sustainability is not an external constraint on military activity, but a defining factor shaping the long-term effectiveness of Canadian defence. Climate change, infrastructure vulnerability, and evolving societal expectations are already affecting how military capability is generated, maintained, and legitimized. While Canada has taken important steps to address climate-related risks, sustainability remains insufficiently integrated into capability development, procurement, infrastructure planning, and governance. This creates a structural gap between policy commitments and defence outcomes.

The policy measures outlined in this paper provide a pathway to address these gaps. Integrating sustainability into defence planning, strengthening climate-resilient Arctic infrastructure, reforming procurement systems, and improving governance would enhance operational readiness, reduce long-term costs, and increase institutional resilience.

Failing to act risks undermining the effectiveness of Canada's defence investments and limiting the ability of the CAF to operate in increasingly unstable environments, particularly in the Arctic. Integrating sustainability into defence planning is therefore not optional, but a strategic necessity.

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