



Deficiencies of the Canadian Defence Industrial Base in the 21st Century Geo-Strategic Environment

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JCSP 49 DL

Exercise Solo Flight

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in the 21st Century Geo-Strategic Environment**

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DEFICIENCIES OF THE CANADIAN DEFENCE INDUSTRIAL BASE IN THE 21ST CENTURY GEO-STRATEGIC ENVIRONMENT

INTRODUCTION

Contrary to the hopes of many that major wars between world powers were unthinkable in the modern era, wars in the early 21st Century closely resemble those of the early 20th Century.¹ Conflicts have become existential and have demonstrated a need for a national effort to produce significant combat power to overcome significant attrition.² In addition to the industrial era's needs for mass and firepower, the modern era has added capabilities such as precision-guided weapons and persistent surveillance provided by the rapid expansion and proliferation of emerging technologies such as miniaturized computers, automation software and artificial intelligence, wireless high-speed telecommunications, and robotics.

The sum of this new reality is that the current and future operating environment will place significant materiel strain on states in the preparation and conduct of state-on-state warfare. Large quantities of both simple and complex materiel will be required from the outset of hostilities, and these needs will only grow as conflicts become ones of national survival, as demonstrated today in Ukraine and the Middle East.³ Canada, as a NATO member-state with clear commitments, will face growing pressure from allies to ensure its military is properly equipped and prepared to face growing threats from adversaries; critical to this, will be the preparation of the Canadian Defence Industrial Base (DIB). The challenges to be materially prepared for combat operations today and in the future, like those faced by Canada in the years preceding the Second World War, are complex and exist at the nexus of national security strategy where military, industrial, technological, and economic strategies come together.⁴

At this time, the Canadian DIB is not adequately positioned, organized, or responsive to the needs of the CAF or its allies to provide the types of materiel in the quality or quantities required for sustained major combat operations.⁵ While the recent update to Canada's defence policy is a positive first step to resolve some of the systemic issues, the unresolved challenges of the Canadian DIB in not meeting Canadian and allied materiel needs will ultimately weaken Canada's influence in its system of alliances and place the Canadian Armed Forces (CAF) in a position of vulnerability should it join a war of attrition that requires materiel rapidly and at scale.⁶

¹ Francis Fukuyama, *The End of History and the Last Man* (New York: Avon, 1993).

² Alex Vershinin, "The Attritional Art of War: Lessons from the Russian War on Ukraine," *Royal United Services Institute* (18 March 2024). Accessed 07 April 2024.

<https://www.rusi.org/explore-our-research/publications/commentary/attritional-art-war-lessons-russian-war-ukraine>.

³ "National Defense Industrial Strategy," U.S. Department of Defense (November 2023), 8. Accessed 07 April 2024. <https://www.businessdefense.gov/NDIS.html>.

⁴ Col C.P. Stacey, *Official History of the Canadian Army in the Second World War - Volume 1* (Ottawa: Queen's Printer and Controller of Stationery, 1955), 20.

⁵ Open Letter, "Canada's National Security and Defence in Peril", *Conference of Defence Associates Institute* (April 2023). Accessed 07 April 2024.

<https://cdainstitute.ca/a-call-for-action-canadas-national-security-and-defence-in-peril/>.

⁶ Hon. Daniel Lang and Hon. Mobina Jaffer, "Reinvesting in the Canadian Armed Forces: A Plan for the Future," *Canadian Senate Standing Committee on National Security and Defence* (May 2017), v. Accessed 07 April 2024.

MAIN BODY

Scope

This paper will provide an overview of the present deficiencies of the Canadian DIB based on an analysis using a model for national strategy. It will then describe these deficiencies in detail using examples from formal reports and testimony to Parliament on the state of Canadian military preparedness. It will finally describe the impacts of this deficiency on Canada's national security and summarize possible solutions to addressing this issue.

Background

National Strategy

To effectively understand the deficiencies Canada faces in arming and sustaining itself, it is important to understand *why* it is important to be armed. A model is helpful for understanding how a nation moves from national interests to national objectives, through national security strategy, to the critical inputs that enable that strategy, and the assessment of the effectiveness of the outputs to deliver on the objectives.

Drs Liotta and Lloyd created such a model, where they described national strategy as:

...the master plan for executing national objectives through a combination of political, economic, military, informational, cultural, and even psychological means. These tools are the basic instruments of national power. Strategic choices indicate how a nation will employ all of these instruments in the pursuit of national objectives. These strategic choices and the assumptions made about them provide guidance and establish limits on lower-level decisions.⁷

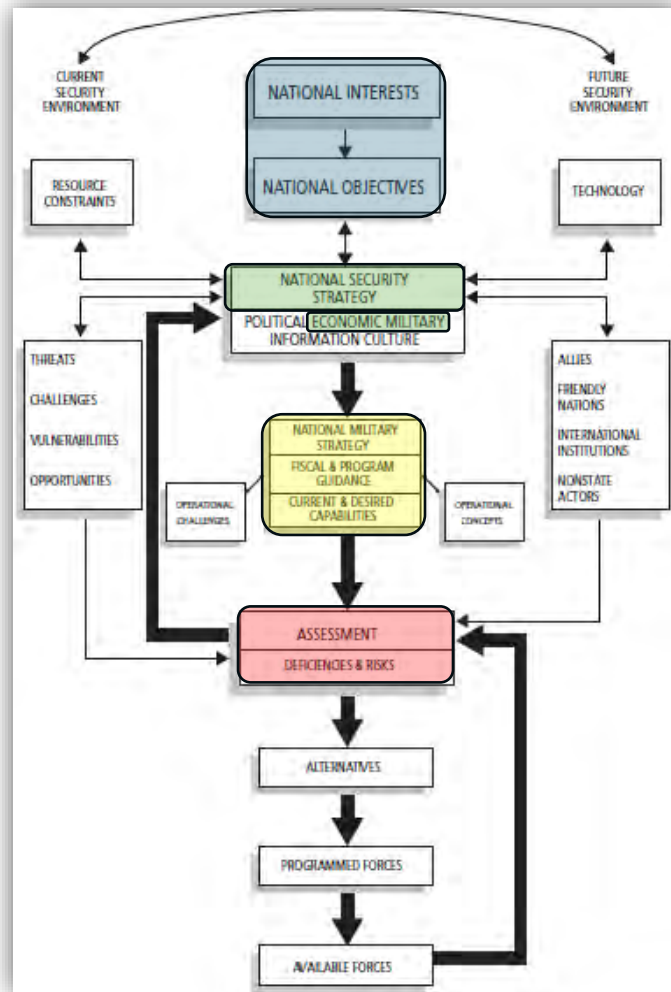
This model is depicted below:

https://sencanada.ca/content/sen/committee/421/SECD/reports/SECDDPRReport_FINAL_e.pdf.

⁷ Dr P.H. Liotta and Dr M. Lloyd, "From Here to There – The Strategy and Force Planning Framework," *Naval War College Review* 58, no.2 (2005): 129. Accessed 06 April 2024.

<https://digital-commons.usnwc.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=2207&context=nwc-review>.

Figure 1 - National Strategy Model



A simple analysis of Canada’s national strategy using the above model and the recently released ONSF will demonstrate why Canada must materially prepare itself for major combat operations but also the challenges in doing so.

1. National Interest – It is in Canada’s national interest to maintain the rules-based international order that underpins Canada’s security and prosperity; this order has become endangered by the forces of competition and instability.⁸
2. National Objectives – To achieve this national interest, the Government of Canada has the following national objectives:⁹

⁸ Government of Canada, *Our North, Strong and Free*, (Ottawa: Department of National Defence, 2024), 13. Outlined in Figure 1 in Blue.

⁹ Government of Canada, *Our North, Strong and Free*, 11. Outlined in Figure 1 in Blue.

- a. Assert Canadian Sovereignty;
 - b. Defend North America; and
 - c. Advance Canada's Global Interest and Values.
3. National Security Strategy – To secure national objectives, Canada will maintain its national security through the participation and expansion of *collective defence* with like-minded states to maintain its security. In line with its values, Canada will leverage all instruments of state power.¹⁰ Specifically:
- a. Military Strategy - To deter any attack on Canada and conflict more broadly, Canada will develop and maintain ready, resilient, and relevant military forces and signal Canada's commitment to our interests and values through a willingness to use force when needed. Canada will maintain our ability to assist our allies and partners from a position of strength.¹¹
 - b. Economic Strategy – To equip and sustain the capabilities that enable the military strategy, the DIB must be structured and reinforced appropriately. Canada will establish long-term partnerships with defence industry to ensure the rapid onboarding of new technologies, and deeper integration with allied supply chains and innovation networks, securing a reliable supply from Canadian industry. Canada will reinforce its supply chains to ensure that critical material, specifically ammunition, is available at the time and place required in adequate quantities.¹²
4. Resourcing of National Defence and Defence Industrial Strategy – To resource the military and defence industrial strategies, ONSF has stated that Canada will spend an additional \$73B over the next 20 years, resulting in Canada spending 1.76% of its GDP on defence with over 20% spent on capital acquisition.¹³ This additional resourcing comes after decades of reported under-resourcing, with defence expenditure reaching less than 1% in 2013.¹⁴
5. Deficiencies and Risks – Since ONSF's release, the policy has been reviewed at length by Canadian and allied defence analysts. In general, there is agreement that the capabilities and initiatives identified are a positive change reflecting a more insecure world. Conversely, the slow rollout of the document, two years after the Russian invasion of Ukraine, creates concern that there is little urgency to affect the policy. Further, the money assigned to some of the more major procurements and initiatives, such as investment in the

¹⁰ *Ibid*, 5.

Outlined in Figure 1 in Green.

¹¹ *Ibid*, 11.

Outlined in Figure 1 in Green.

¹² Government of Canada, *Our North, Strong and Free*, 21.

Outlined in Figure 1 in Green.

¹³ *Ibid*, 30.

Outlined in Yellow.

¹⁴ *Ibid*, v.

DIB, is inadequate to create the desired capability.¹⁵ The obvious risk from this lack of attention and underfunding is that Canada's military and DIB remain ill-structured and ill-equipped, after decades of underinvestment, to address the increasingly hostile geopolitical environment. These risks will likely leave Canada unprepared to support itself and its allies in maintaining collective defence.

The analysis of Canada's national strategy demonstrates that while Canada is now rightfully viewing the worsening state of the world as a threat to Canadian security and prosperity, it has yet to fully resource the capabilities required to enable a security strategy that can deter or defeat those threats. This is not without precedent.

Historical Legacy of Unpreparedness

Canada has a long and well-described history of under-investment in its defence. Col. C.P. Stacey's *Official History of the Canadian Army in the Second World War* sums up the cultural dynamic of military unpreparedness in his first chapter's overview, 'The Canadian Tradition':

For generations, Canadian governments and parliaments, and certainly also the public at large, appeared to be convinced that it was time enough to begin preparing for war after war had broken out. It would be easy to demonstrate the country's traditional dislike of peacetime armaments and unwillingness to spend money upon them, and to give examples of how on many occasions the sudden appearance of a crisis led ministers and legislators to take, hurriedly and belatedly, the military measures for which in more peaceful moments they had seen no need.¹⁶

While the beginning of the Cold War ushered in a professional, much larger CAF and an associated DIB based on the hard-won experiences of the Second World War, the institutions, infrastructure, and capabilities have been shown to receive fewer and fewer resources as time progressed. The federal government has released eight defence policies since the Second World War; in general, they all accurately described the security situation but then failed to provide the long-term funding to achieve the desired outcomes.¹⁷ Further reviews and updates over the years have highlighted that defence readiness and the defence industry that underpins it have not been maintained at appropriate levels.¹⁸

¹⁵ Eugene Lang, "Our North, Strong and Free: Odd Innovations in Canadian Defence Policy," *Policy Options*, accessed 07 May 2024, <https://policyoptions.irpp.org/magazines/april-2024/defence-policy-innovation/#:~:text=Our%20North%2C%20Strong%20and%20Free%20is%20above%20all%20else%20an,relative%20tight%20fiscal%20box%20of>.

¹⁶ Colonel C.P. Stacey, *Official History of the Canadian Army in the Second World War* (Ottawa: Queen's Printer and Controller of Stationary, 1955), 3.

¹⁷ J. Craig Stone and B. Solomon, "The Political Economy of Defence," in *Canadian Defence Policy in Theory and Practice* (Ottawa: Palgrave Macmillan, 2019), 143.

¹⁸ Hon Daniel Lang and Hon Mobina Jaffer, "Reinvesting in the Canadian Armed Forces: A Plan for the Future," *Canadian Senate Standing Committee on National Defence and Security*, May 2017. Accessed 07 April 2024; Hon

MAIN BODY

The Defence Industrial Base as an Instrument of National Power

That fact that the CAF is the primary component of Canada's military power goes without question. The Canadian DIB, however, is often overlooked as a component of economic power. The DIB is primarily meant to equip and sustain the CAF in both peace and war, with a secondary focus on equipping and sustaining Canada's allies. The present reality is that the Canadian DIB, like the DIBs within allied states, including the United States, saw significant contraction following the Cold War and is not ready to equip and sustain Canadian or allied militaries in the event of sustained major combat operations.¹⁹

The Canadian DIB today is still considered an instrument of national power with direct government investment flowing into the Munitions Supply Program (MSP).²⁰ The MSP presently focuses on ammunition and small arms production required to arm the CAF, which represents only a portion of the materiel required. That said, it does represent a jump-off point for the effective arming and sustainment of the CAF, as well as an example of effective defence industrial planning. Overall, the Canadian DIB, including MSP companies, directly contributed \$7B to Canadian GDP in 2020 with 58,000 employees across the country.²¹ While not insignificant, the reality is that the Canadian DIB can only produce a limited quantity of goods across the spectrum of equipment and supplies required by the CAF and Canada's allies. For perspective, the approximate balance of sales is equal between CAF and numerous foreign customers, implying that a CAF-sized amount of materiel, tailored to peacetime training, is being provided to the entirety of the remainder of the free world.²²

Given a worsening geostrategic situation, this is inadequate both internally to Canada and externally within its alliances.

Geo-Strategic Context - A Worsening Situation

Without question, the rules-based international order that has underpinned Canadian prosperity since the Second World War is at risk. The resurgence of state-on-state warfare in the past five years (Nagorno-Karabakh War, Russo-Ukraine War, Gaza War, Chinese threat to Taiwan) has demonstrated that the end of history has not arrived. The People's Republic of China, the Russian Federation, and the Islamic Republic of Iran, amongst others, are presently aligning their intentions to challenge the systems, structures, and values that have maintained global security since the mid-twentieth century. These powers have begun to escalate their

John McKay, "An Interim Report on the Defence of Canada in a Rapidly Changing Threat Environment," *Canadian House of Commons Standing Committee on National Defence*, June 2022, 8. Accessed 05 April 2024.

<https://www.ourcommons.ca/Content/Committee/441/NDDN/Reports/RP11857914/nddnrp01/nddnrp01-e.pdf>
¹⁹ United States Government, *National Defence Industrial Strategy* (Washington: *Department of Defence*, Nov 2023), 7.

²⁰ Government of Canada, "Munitions Supply Program," last modified 28 April 2021. Accessed 07 April 2024.
<https://www.tpsgc-pwgsc.gc.ca/app-acq/amd-dp/munitions-eng.html>.

²¹ Government of Canada, *State of Canada's Defence Industry Report* (Ottawa: Industry, Science, Economic Development – Canada: Spring 2022), 21. Accessed 04 May 2024.
<https://ised-isde.canada.ca/site/aerospace-defence/en/state-canadas-defence-industry>.

²² Government of Canada, *State of Canada's Defence Industry Report*, 14.

actions beyond economics and influence into the military realm. In this context, the requirements for materiel, both quantity and quality, and the reality of attrition have reasserted themselves at a time when Canada and its allies are not fully prepared.²³

Reviews of the Canadian DIB and the MSP have long concluded that they are ill-suited to supporting the CAF and its allies. Whether these reviews are formal, such as the 2007 Chief Review Service evaluation, or informal, such as recent testimony by the Chief of Defence Staff (CDS) to Parliament, the conclusions are that the Canadian DIB and the MSP are not suited to arming and sustaining the CAF and its allies.²⁴ Focusing on these deficiencies in the context of land-warfare requirements provides insight into the present shortcomings.

Qualitative Limitations of the Canadian DIB

With technological advances accelerating and the proliferation of technologically-enabled military equipment that is accessible by any state actor, Canada's adversaries are now equipped with materiel that was only available to NATO and like-minded allies until recently. Unfortunately, the Canadian DIB cannot provide the technological quality of materiel required for major combat operations against a peer state.

The Canadian DIB, particularly MSP companies, were founded decades ago; their facilities continue to produce equipment and supplies that reflect their age. This is a result of production being tailored to the CAF (a relatively small force), limited defence exports to allies, and limited research and development dollars being invested.²⁵ Examples abound, but recent testimony to Parliament by the CDS provides insight. General Eyre testified in September 2023 that he was extremely concerned that the Canadian DIB could only produce legacy 155mm artillery projectiles that have significantly less range and lethality than modern projectiles.²⁶ The current conflict in Ukraine demonstrates the requirement for modern artillery ammunition and other modern munitions and systems (missiles, ground-attack helicopters, uncrewed aircraft systems, artillery), which Canada also lacks the ability to produce domestically.²⁷ To effectively

²³ Seth G. Jones, "Empty Bins in a Wartime Environment: The Challenge to the U.S. Defense Industrial Base," Centre for Strategic and International Studies (January 2023), 5. Accessed 07 April 2024.

<https://www.csis.org/analysis/empty-bins-wartime-environment-challenge-us-defense-industrial-base>.

²⁴ Government of Canada, "Evaluation of the Munitions Supply Program (MSP)," Chief of Revenue Services (2007), 28. Accessed 27 November 2023. https://publications.gc.ca/site/archivee-archived.html?url=https://publications.gc.ca/collections/collection_2016/mdn-dnd/D58-164-2007-eng.pdf.

²⁵ "Canada's Defence Industry – A Vital Partner Supporting Canada's Economic and National Interests," *Canadian Association of Defence and Security Industries* (December 2009), 6. Accessed 07 April 2024.

[https://www.ic.gc.ca/eic/site/060.nsf/vwapj/CanadianAssociationDefenceSecurityIndustries-Annex-D.pdf/\\$FILE/CanadianAssociationDefenceSecurityIndustries-Annex-D.pdf](https://www.ic.gc.ca/eic/site/060.nsf/vwapj/CanadianAssociationDefenceSecurityIndustries-Annex-D.pdf/$FILE/CanadianAssociationDefenceSecurityIndustries-Annex-D.pdf).

²⁶ General Wayne Eyre, "Briefing on the Mandate and Priorities of the Minister of National Defence," testimony to the Canadian House of Commons Standing Committee on National Defence, 29 September 2023, video, 16:43:50. Accessed 26 November 2023.

<https://www.ourcommons.ca/embed/en/m/12318308?ml=en&vt=watch&autoplay=true>.

M107 is a projectile designed in the 1930s and has long been divested for operational use by Canada's allies.

²⁷ Hon. Daniel Lang and Hon. Mobina Jaffer, "Reinvesting in the Canadian Armed Forces: A Plan for the Future," *Canadian Senate Standing Committee on National Security and Defence* (May 2017), 15. Accessed 07 April 2024. https://sencanada.ca/content/sen/committee/421/SECD/reports/SECDDPRReport_FINAL_e.pdf.

arm the CAF and its allies, the Canadian DIB will need to qualitatively improve the types of equipment it can provide.

Quantitative Limitations of the Canadian DIB

Contemporary conflicts also demonstrate that mass is required, both in terms of troops as well as materiel. At this time, the Canadian DIB, including the MSP companies, cannot provide materiel in the quantities required to sustain the CAF and its allies in the context of state-on-state attritional warfare.

The Canadian DIB suffered from consolidation following the Cold War, resulting in a curtailment of production volumes to focus on sustaining peacetime training of a CAF that was also reduced in size. Returning to General Eyre's testimony, he also spoke about the quantitative challenges in the production of artillery ammunition. Based on industry statistics, he explained that 155mm projectile production is approximately 3000 projectiles per month; this represents less than a day's worth of expenditure by the Ukrainians in their conflict. This quantity of production has remained stagnant since the Russo-Ukraine War began and continues despite calls by the United States government for an alliance-wide increase in production and offers to procure additional quantities.²⁸ If Canada is to effectively arm the CAF and its allies effectively, it must increase production volumes such that it can fight on the modern battlefield as well as absorb the attrition, both loss of systems and expenditure of munitions, that will occur.²⁹

Signs of Change

The 2024 defence policy update, *Our North, Strong and Free*, signals a positive initial effort to address some of the mentioned concerns. Specific areas of investment provide hope that Canada will address the DIB's qualitative and quantitative deficiencies as it prepares for conflict in the 21st century.

Regarding the example of 155mm artillery ammunition production, the policy assigns \$9.461B over 20 years. This investment into the Canadian DIB and, specifically, into MSP companies that fabricate ammunition, will improve both the volume and type of ammunition being produced in line with NATO targets. More broadly, investments in capabilities, some of which will be fully or partially built in Canada, have been announced, including investments in long-range precision missiles, tactical helicopters, uncrewed aircraft systems, and suites of modern communications equipment.³⁰

As the policy projects these investments primarily in the years beyond 2030, it remains uncertain whether these investments will be adequate or whether they will occur at all, given Canada's propensity to cut defence spending when faced with financial concerns.

²⁸ Murray Brewster, "Top Generals Warn That Allies — Canada Included — Are Running Dangerously Low on Artillery Shells," CBC News, last modified 06 October 2023, accessed 06 May 2024.

<https://www.cbc.ca/news/politics/canadian-armed-forces-artillery-shells-nato-ukraine-wayne-eyre-1.6988281>.

²⁹ Barry Watts and Todd Harrison, "Sustaining Critical Sectors of the U.S. Defense Industrial Base," Center for Strategic and Budgetary Assessments, 61. Last modified 2011, accessed 07 April 2024.

<http://nation.time.com/wp-content/uploads/sites/8/2011/09/2011-09-20-defense-industrial-base1.pdf>.

³⁰ Government of Canada, *Our North, Strong and Free*, 11, 30.

Impacts to Canada of Unresolved Deficiencies with the Canadian DIB

Should Canada not invest in the CAF and the Canadian DIB to remedy the identified deficiencies, Canada's reputation on the world stage will be affected. NATO defence budget tracking has clearly identified Canada as an outlier in under-spending both in terms of GDP and spending on capital procurement.³¹ While ONSF plans to correct the deficiency related to capital investment (should it occur as planned), Canada remains delinquent in spending the 2% goal as agreed to at the 2014 Wales and 2023 Vilnius NATO summits. Undoubtedly, this failure to spend according to signed agreements impacts Canada's position with the alliance.

Other impacts will be felt in terms of preparedness and resiliency. Canada's unpreparedness will impact the effectiveness of the CAF and Canada in fighting and winning sustained conflicts of the 21st century. As demonstrated by contemporary conflicts, sustaining of combat forces is crucial, and world events and conflict will undoubtedly lead to supply shocks. Evidence of this was demonstrated broadly by the impact on the availability of goods (common medicine, vaccines) during the COVID-19 pandemic, and more specifically in recent months in the setbacks in Ukraine when materiel from the United States ceased to arrive. Canada's ability to sustain its own forces and those of its allies play a crucial role in collective defence, and it is presently incapable of performing this role.³²

Ultimately, the impact of the inability to equip and sustain the CAF for future conflicts will be borne on the battlefield. The qualitative edge of the CAF has been dulled over decades of deficient investment that has seen systems kept in service far too long (CF-18, Halifax Class Frigate, M777 Howitzer) and at numbers that cannot provide the depth of capability to absorb attrition. While many major combat systems across the CAF are in the midst of being replaced, if Canada were to join a conflict today, the CAF would be fighting with equipment designed 25 years ago for a different type of war. Moreover, the levels of operational supplies, ammunition and spare parts, held for conflict are inadequate for sustained combat. Returning to General Eyre's testimony to Parliament, he laid bare the reality that the CAF faces in sustaining combat operations:

I am very concerned about our ammunition stocks. NATO high-readiness forces ask us to have what's called 30 days of supply. If we were to consume munitions [at] the same rate that we're seeing them [fired] in Ukraine, we would be out in some cases in days and it would take years to restock.³³

The qualitative and quantitative deficiencies of the CAF and Canada's DIB have now manifested in operational risk. While Canada has strong alliances and the benefit of geography to ensure it is not at risk of tactical surprise at home, CAF forces are deployed globally opposite

³¹ "Defence Expenditure of NATO Countries (2014-2023)," *NATO* (14 March 2024). Accessed 07 April 2024. https://www.nato.int/nato_static_fl2014/assets/pdf/2024/3/pdf/240314-def-exp-2023-en.pdf.

³² Binyan Solomon and Christopher E. Penny, "Canadian Defence Industrial Base," in *The Economics of the Global Defence Industry*, ed Keith Hartley and Jean Belin (New York: Routledge, 2019), 448. Accessed 27 November 2023. https://link.springer.com/chapter/10.1007/978-3-030-26403-1_9.

³³ Murray Brewster, "Top Generals Warn That Allies — Canada Included — Are Running Dangerously Low on Artillery Shells."

Canada's geo-strategic adversaries. It can no longer be assumed that the solutions of the post-Second World War will safeguard Canada's ongoing security or prosperity.

Resolving Deficiencies in the Canadian DIB

Based on the identified deficiencies, the following actions should be taken to ensure that the Canadian DIB is fit to support the CAF and its allies in the contemporary and future operating environment:

1. **Mobilization Planning** – Based on the worsening geo-strategic situation and the possibility of state-on-state war between Canada and its adversaries, the Government of Canada and the CAF should conduct thorough mobilization planning. Planning ensures that regardless of investment, there is a roadmap for the expansion of the CAF to war-time size; this plan should include quantities of units, personnel, and essential equipment and supplies. This type of planning ensures that Canada is not paralyzed with indecision should a conflict break out and was done very effectively prior to the Second World War with the drafting and approval of *Defence Scheme No3*, focused on military mobilization and strategy, and the Government of Canada's *War Book*, which focussed on the whole of government actions in the event of war.³⁴
2. **National and Alliance Rationalization of Production** – With a roadmap for the requirements for materiel requirements of the CAF and Canada, the Government of Canada should then rationalize what materiel must be produced in Canada for both internal and external use, and what materiel can be sourced externally from *secure sources*. This rationalization should be a clear-eyed analysis of the current state of the Canadian DIB and what it can and cannot produce, as well as its ability and limitations to expand production based on capital requirements, labour, technology, and raw materials. As Canada will fight in a system of alliances, it is not necessary (or desirable) for Canada to produce all types of equipment and supplies, so it will be important to identify where investment is best placed. This may be as simple as identifying that armoured fighting vehicles (built by General Dynamic Land Systems Canada) can effectively be produced in Canada at the quantity and quality required while air defence systems cannot. Canada should then communicate these abilities and limitations to its allies and ensure that this is part of an overall alliance-wide plan.
3. **Investment and Build-Up of the DIB** – With the CAF and allied requirements identified and an assessment completed on what Canada can and cannot contribute, relevant industries must be developed and scaled via government investment. For those industries that are already capable, the government should negotiate direct contracts for major quantities on clear timelines to force compliance. This will benefit industry, both large companies and their feeder sub-contractors, with the confidence of ongoing large contracts to drive their own investment and innovation. For under-developed industries, the government should create crown corporations to acquire and build-up latent Canadian industrial capacity. This will likely be required for many sub-systems and components, down to critical raw materials such as the inputs into explosives production, to ensure that

³⁴ Colonel C.P. Stacey, *Official History of the Canadian Army in the Second World War*, 33.

there are no bottlenecks from resources that are not readily available during peacetime. This method of both direct contracting and state ownership in industry was used to great effect by the United States and Canada during the Second World War.³⁵

4. Expansion of the DIB – Related to the first recommendation, an ongoing analysis of requirements for the CAF and its allies must continue. It is not inconceivable that adversary states could seize territory or deny access to allied states, which would disrupt Canadian or allied supply chains. Planning must consider supply chain resiliency for critical materiel and create contingency plans to develop industries, even from scratch, to ensure that critical raw materials, components, and weapon systems are always available should the need arise. This may require significant investment in the event there are no available domestic industries to leverage. In these instances, ongoing investment in research and development, whether by government, academia, or industry, is essential to ensure that imposed limitations can be overcome through ingenuity and innovation.

The present deficiencies of the Canadian DIB are neither novel nor insurmountable. With prudent planning and resourcing, Canada can ensure that it is materially prepared for future state-on-state conflict as we have done in the past.

CONCLUSION

Canada faces a return to state-on-state warfare, characterized by the proliferation of technologically advanced systems and the threat of significant attrition, which requires the quantity of materiel of the 20th Century with the technological quality of the 21st Century. Canada's own national security strategy and its system of alliances demand that it is capable of conducting combat operations within this environment. The Canadian DIB, as an important instrument of Canadian state power, is meant to provide a significant portion of the materiel to equip the CAF as well as the principal mechanism to sustain it during combat operations in this environment. The Canadian DIB is presently not capable of providing the quantity or quality of materiel required for sustained combat operations. This is due to a multitude of reasons that allowed it to degrade since the end of the Second World War, with increased degradation following the Cold War. The ongoing lack of preparedness of the Canadian DIB will impact Canada's influence in global events, its standing with its allies, and, most critically, the survival of CAF members themselves. These deficiencies must be addressed if the national interest, the maintenance, and expansion of the rules-based international order are meant to endure during the 21st century.

³⁵ Elberton Smith, *The Army and Economic Mobilization* (Washington: Centre of Military History – United States Army, 1959), 440.

BIBLIOGRAPHY

- “Canada’s Defence Industry – A Vital Partner Supporting Canada’s Economic and National Interests,” *Canadian Association of Defence and Security Industries*. December 2009. Accessed 07 April 2024.
[https://www.ic.gc.ca/eic/site/060.nsf/vwapj/CanadianAssociationDefenceSecurityIndustries-Annex-D.pdf/\\$FILE/CanadianAssociationDefenceSecurityIndustries-Annex-D.pdf](https://www.ic.gc.ca/eic/site/060.nsf/vwapj/CanadianAssociationDefenceSecurityIndustries-Annex-D.pdf/$FILE/CanadianAssociationDefenceSecurityIndustries-Annex-D.pdf).
- “Canada’s National Security and Defence in Peril.” *Conference of Defence Associates Institute* (April 2023). Open Letter. Accessed 07 April 2024.
<https://cdainstitute.ca/a-call-for-action-canadas-national-security-and-defence-in-peril/>.
- “Defence Expenditure of NATO Countries (2014-2023).” *NATO*. 14 March 2024. Accessed 07 April 2024.
https://www.nato.int/nato_static_fl2014/assets/pdf/2024/3/pdf/240314-def-exp-2023-en.pdf.
- “Munitions Supply Program.” *Government of Canada*. Last modified 28 April 2021. Accessed 27 November 2023.
<https://www.tpsgc-pwgsc.gc.ca/app-acq/amd-dp/munitions-eng.html>.
- Brewster, Murray. “Top Generals Warn That Allies — Canada Included — Are Running Dangerously Low on Artillery Shells.” *CBC News*. Last modified 06 October 2023. Accessed 06 May 2024.
<https://www.cbc.ca/news/politics/canadian-armed-forces-artillery-shells-nato-ukraine-wayne-eyre-1.6988281>.
- Fukuyama, Francis. *The End of History and the Last Man*. New York: Avon, 1993.
- General Eyre, Wayne. “Briefing on the Mandate and Priorities of the Minister of National Defence.” Testimony to the *Canadian House of Commons Standing Committee on National Defence*. 29 September 2023. Video. Accessed 26 November 2023.
<https://www.ourcommons.ca/embed/en/m/12318308?ml=en&vt=watch&autoplay=true>.
- Government of Canada. “Evaluation of the Munitions Supply Program (MSP).” *Chief of Revenue Services* (2007). Accessed 27 November 2023.
https://publications.gc.ca/site/archieve-archived.html?url=https://publications.gc.ca/collections/collection_2016/mdn-dnd/D58-164-2007-eng.pdf.
- Government of Canada. “Munitions Supply Program.” Last modified 28 April 2021. Accessed 07 April 2024.
<https://www.tpsgc-pwgsc.gc.ca/app-acq/amd-dp/munitions-eng.html>.
- Government of Canada. *State of Canada’s Defence Industry Report*. Ottawa: Industry, Science, Economic Development – Canada: Spring 2022. Accessed 04 May 2024.
<https://ised-isde.canada.ca/site/aerospace-defence/en/state-canadas-defence-industry>.

Government of Canada. *Our North, Strong and Free*. Ottawa: Department of National Defence, 2024.

Jones, Seth G. "Empty Bins in a Wartime Environment: The Challenge to the U.S. Defense Industrial Base." *Centre for Strategic and International Studies* (January 2023).
<https://www.csis.org/analysis/empty-bins-wartime-environment-challenge-us-defense-industrial-base>.

Hon. Lang, Daniel and Hon. Jaffer, Mobina. "Reinvesting in the Canadian Armed Forces: A Plan for the Future," *Canadian Senate Standing Committee on National Security and Defence*. May 2017. Accessed 07 April 2024.
https://sencanada.ca/content/sen/committee/421/SECD/reports/SECDDPRReport_FINAL_e.pdf.

Lang, Eugene. "Our North, Strong and Free: Odd Innovations in Canadian Defence Policy." *Policy Options*. Last modified 19 April 2024. Accessed 07 May 2024.
<https://policyoptions.irpp.org/magazines/april-2024/defence-policy-innovation>.

Dr Liotta, P.H. and Dr Lloyd M. "From Here to There – The Strategy and Force Planning Framework." *Naval War College Review* 58, no.2 (2005): 129. Accessed 19 December 2023.
<https://digital-commons.usnwc.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=2207&context=navwc-review>.

Hon McKay, John. "An Interim Report on the Defence of Canada in a Rapidly Changing Threat Environment." *Canadian House of Commons Standing Committee on National Defence*. June 2022. Accessed 05 April 2024.
<https://www.ourcommons.ca/Content/Committee/441/NDDN/Reports/RP11857914/nddnrp01/nddnrp01-e.pdf>.

Smith, Elberton. *The Army and Economic Mobilization*. Washington: Centre of Military History – United States Army, 1959.

Solomon, Binyan and Penny, Christopher E. "Canadian Defence Industrial Base." *The Economics of the Global Defence Industry*, ed Hartley and Belin (New York: Routledge, 2019). Accessed 27 November 2023.
https://link.springer.com/chapter/10.1007/978-3-030-26403-1_9.

Col Stacey, C.P. *Official History of the Canadian Army in the Second World War - Volume 1*. Ottawa: Queen's Printer and Controller of Stationary, 1955.

Stone, J. Craig and Solomon, B. "The Political Economy of Defence." *Canadian Defence Policy in Theory and Practice* (Ottawa: Palgrave Macmillan, 2019).

United States Government. "National Defense Industrial Strategy." U.S. Department of Defense. November 2023. Accessed 07 April 2024.
<https://www.businessdefense.gov/NDIS.html>.

Vershinin, Alex. "The Attritional Art of War: Lessons from the Russian War on Ukraine." *Royal United Services Institute*. Last modified 18 March 2024. Accessed 07 April 2024.
<https://www.rusi.org/explore-our-research/publications/commentary/attritional-art-war-lessons-russian-war-ukraine>.

Watts, Barry and Harrison, Todd. "Sustaining Critical Sectors of the U.S. Defense Industrial Base." *Center for Strategic and Budgetary Assessments*. Last modified 2011. Accessed 19 December 2023.
<http://nation.time.com/wp-content/uploads/sites/8/2011/09/2011-09-20-defense-industrial-base1.pdf>.