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THE CANADIAN NORTHERN CORRIDOR ROUNDTABLE PROGRAM: RESULTS AND LESSONS LEARNED

Katharina Koch, Emily Galley, Evgeniia (Jen) Sidorova, G. Kent Fellows and Robert Mansell

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FOREWORD

THE CANADIAN NORTHERN CORRIDOR RESEARCH PROGRAM PAPER SERIES

This paper is part of a special series in *The School of Public Policy Publications,* investigating a concept that would connect the nation's southern infrastructure to a new series of corridors across middle and northern Canada. This paper is an output of the Canadian Northern Corridor Research Program.

The Canadian Northern Corridor Research Program at The School of Public Policy, University of Calgary, is the leading platform for information and analysis on the feasibility, desirability, and acceptability of a connected series of infrastructure corridors throughout Canada. Endorsed by the Senate of Canada, this work responds to the Council of the Federation's July 2019 call for informed discussion of pan-Canadian economic corridors as a key input to strengthening growth across Canada and "a strong, sustainable and environmentally responsible economy." This Research Program will benefit all Canadians, providing recommendations to advance the infrastructure planning and development process in Canada.

This paper, "The Canadian Northern Corridor Roundtable Program: Results and Lessons Learned", falls under theme *Social Benefits and Costs* of the program's eight research themes:

- Strategic and Trade Dimensions
- Funding and Financing Dimensions
- Legal and Regulatory Dimensions
- Organization and Governance
- Geography and Engineering
- Economic Outcomes
- Social Benefits and Costs
- Environmental Impact

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KEY MESSAGES

- Canada needs a long-term strategic and integrated infrastructure vision for mid- and northern Canada that focuses on long-term policy priorities of communities to address supply-chain constraints and maintain the country's global competitiveness.
- It is essential for infrastructure policy development in mid- and northern Canada to prioritize collaborative approaches that engage diverse rights- and stakeholders and foster meaningful partnerships, with a focus on respecting community rights, interests and aspirations while promoting sustainable and inclusive development through the coordination of actors.
- Managing cooperation between communities, governments and industries can be complex. Effective governance mechanisms, such as collaborative planning, stakeholder engagement and dispute resolution processes, are crucial to ensure that infrastructure development is equitable, inclusive and sustainable.
- Streamlining of regulatory frameworks is required to improve efficiency, integration and coordination in the planning and approval of hard and soft infrastructure development.
- Decision-makers should adopt a holistic infrastructure approach that includes not only physical infrastructure assets but also digital and soft infrastructure supporting social goals and outcomes such as education and healthcare.
- A focus on local community capacity-building should be incorporated into any type of northern infrastructure development strategy to help support communities to address their priorities and to foster cooperation between both public and private rights- and stakeholders.
- While federal support is important, any national infrastructure vision for mid- and northern Canada must incorporate the priorities of local Indigenous and municipal rights- and stakeholders. This approach avoids a top-down infrastructure approach and recognizes the role these communities have in addressing the challenges related to climate change and supply-chain constraints that Canadians are facing today.
- A majority of communities in mid- and northern Canada consist of Indigenous populations, including First Nations, Métis and Inuit. Indigenous self-governance, participation and inclusion and Indigenous-owned initiatives must be incorporated into any northern corridor framework to support reconciliation.

- While infrastructure needs vary across mid- and northern Canada, the digital divide is a shared concern. To sustain prosperity and mitigate consequences associated with geographical remoteness, such as a lack of access to health services, education and social connections, communities need reliable and affordable high-speed internet access.
- Recent disruptions in global and Canadian supply chains underline the need for strategic and targeted infrastructure optionality, ensuring reliable transportation and access to goods and services.
- Infrastructure development, focused on transportation and access to services such as healthcare, is essential to safeguard the high living standards we are enjoying today for future generations. For all Canadians to benefit, infrastructure development must adhere to the principles of equity, diversity, inclusion and accessibility.

EXECUTIVE SUMMARY

The Canadian Northern Corridor (CNC) Research Program is an investigation of the feasibility, desirability and acceptability of the corridor concept in advancing integrated, long-term infrastructure planning and development in Canada. The concept involves a series of multi-modal rights-of-way across mid- and northern Canada to provide space for efficient, timely and integrated development of infrastructure, including combinations of road, rail, transmission, pipeline, communications, port and airport infrastructure.

While there is no final CNC routing, the notional corridor reaches across Canada's mid- and northern regions, connecting all three coasts and creating interlinkages with the existing southern transportation corridors. These would be expected to make public and private infrastructure investments more attractive by reducing approval costs and uncertainties, sharing costs associated with establishing and administering rights-of-way, decreasing environmental footprints and, in general, moving to a more strategic, integrated and long-term approach to infrastructure planning and development. Overall, a CNC could potentially expand and diversify Canada's international and national trade opportunities, increase Canada's overall income and employment growth, support development and living standards for Indigenous, mid- and northern Canadian communities, and assist with Canada's northern security and sovereignty goals.

To analyze the feasibility, desirability and acceptability of a Canadian Northern Corridor, in addition to research studies spanning eight themes[1] and a Community Engagement Program, our research includes roundtable discussions with stakeholders from federal, provincial, territorial, municipal and Indigenous governments; industry (transportation, energy, telecommunications, tourism, natural resources and Indigenous funding and financing); and social and environmental NGOs. The Stakeholder Engagement Program conducted as part of the CNC Research Program addresses three key questions: 1) what key gaps in infrastructure and infrastructure policy persist according to potential rights- and stakeholders? 2) What are the potential impacts, challenges and opportunities of the CNC according to those rights- and stakeholders? 3) Which factors and conditions would make corridor development acceptable or unacceptable for a given rights- or stakeholder? This report presents a thematic content analysis aggregating the qualitative data collected at seventeen virtual CNC roundtable engagement sessions, which took place from January 2022 until June 2022. All roundtable discussions were structured around four core themes: infrastructure needs and priorities across mid- and northern Canada; challenges, barriers and lessons learned from previous infrastructure development initiatives; expected benefits and governance considerations related to a CNC; and trade-offs and conditions for CNC development.

While discussing infrastructure needs and priorities, roundtable participants identified several areas of concern related to the following: a lack of adequate funding and financing options for infrastructure projects; equitable access to infrastructure, including transportation, energy, water and broadband; the mitigation of environmental concerns

[1] The Canadian Northern Corridor Research Program includes multiple studies across eight areas of expertise: Strategic and Trade Dimensions; Funding and Financing; Legal and Regulatory; Organization and Governance; Geography and Engineering; Economic Outcomes; Social Benefits and Costs; and Environmental Impacts.

in current development; meaningful engagement and participation of Indigenous communities; a lack of infrastructure network resilience to mitigate impacts of climate change; overly complex and overlapping regulatory frameworks; identification of infrastructure priorities that align with economic growth strategies; and allocation of sufficient resources and capacity for the long-term maintenance and operation of existing and new infrastructure.

Digital connectivity was a common concern mentioned across all roundtables. Participants lamented that northern and remote communities lack reliable internet access, and, if available, download and upload speeds did not reach the same quality as in urban centres. Insufficient broadband access creates additional difficulties by preventing access to online services, including education and healthcare. In terms of barriers and lessons learned, roundtable participants highlighted that the current piecemeal approach to infrastructure is inefficient and has created shortcomings and bottlenecks. For example, the perspective that infrastructure development often caters to the needs of southern metropolitan areas while smaller communities in provinces and territories face lower priority on federal and provincial/territorial policy agendas is a common concern. This can result in disparities in infrastructure investments and development between urban and rural areas, leading to difficulties for smaller communities in accessing necessary infrastructure services and resources.

Participants also shared the perception that regulatory processes have become less streamlined over time and may overlap across different levels of government, creating additional administrative hurdles for project proponents. This can affect infrastructure development in smaller communities, leading to delays, and increased costs and uncertainties in the regulatory environment. Streamlining regulatory processes should be a key priority in infrastructure policy development to improve the efficiency and effectiveness of infrastructure project approvals, reduce red tape, and facilitate timely and cost-effective project implementation. This may involve efforts to simplify regulatory requirements, coordinate among different levels of government, harmonize regulations across jurisdictions, and enhance transparency and accountability in decision-making processes. However, achieving a balance between regulatory efficiency and environmental/social safeguards is a complex task that requires careful consideration of various perspectives and stakeholder interests, as well as compliance with relevant laws, regulations and best practices.

Roundtable participants recognized the current and potential future effects of climate change on global supply chains, which, according to scientific predictions, will lead to an increase in disruptions, with potentially hazardous outcomes for livelihoods. Improved community resilience, achieved through cooperation and capacity-building, helps mitigate the effects of climate change on the energy grid as well as on road- and rail connections. To achieve better outcomes from infrastructure strategies, participants wished for more cooperation between all rights- and stakeholders. Too often, initiatives and projects compete against each other for scarce resources due to budgetary constraints, with smaller communities sometimes failing to effectively advocate for their needs and the priorities essential for the well-being of their residents. Instead, we argue that the focus of governments must be shifted towards building local capacity and creating platforms that help foster exchange and innovation to collectively address shared infrastructure-related challenges.

Several benefits of developing a corridor were articulated by stakeholders. The CNC may offer a clear and comprehensive funding and governance framework, potentially spearheaded by the federal government but developed cooperatively with all rights- and stakeholders. A well-designed corridor-funding and governance framework could help streamline decision-making processes, facilitate coordination among different levels of government, stakeholders and communities and ensure that infrastructure investments are strategically aligned with regional needs and priorities. It could also provide a platform for collaborative planning and development of infrastructure projects that serve the interests of all parties involved.

The federal government can play a key role in providing leadership and support for the development of the corridor, but a collaborative approach that involves all relevant rights- and stakeholders is essential for its success. Through cooperative efforts and a comprehensive funding and governance framework, the corridor has the potential to support infrastructure development across mid- and northern Canada in a way that is inclusive, sustainable and aligned with regional needs and priorities.

In addition to potential benefits, participants identified specific trade-offs and conditions that are fundamental for the success of a CNC. One condition for corridor development is the integration of local expertise; participants described experiences in which southern-based solutions sometimes do not apply to northern conditions and circumstances. Another important drawback of any kind of development is the impact on the environment. A CNC was considered a mega-project, which could potentially have cascading effects on northern environments, including the boreal forest, permafrost and wildlife. Mitigating and identifying key risks to the environment via impact assessments, environmental monitoring and community engagement programs are key conditions. In addition to environmental concerns, participants frequently noted the social circumstances in smaller communities and how they may benefit from a corridor, alongside potential negative impacts of increased connectivity, such as the flow of illegal substances. Infrastructure such as housing, healthcare and education were considered key priorities in mid- and northern Canadian communities, and potential corridor infrastructure must make provisions for such soft infrastructure.

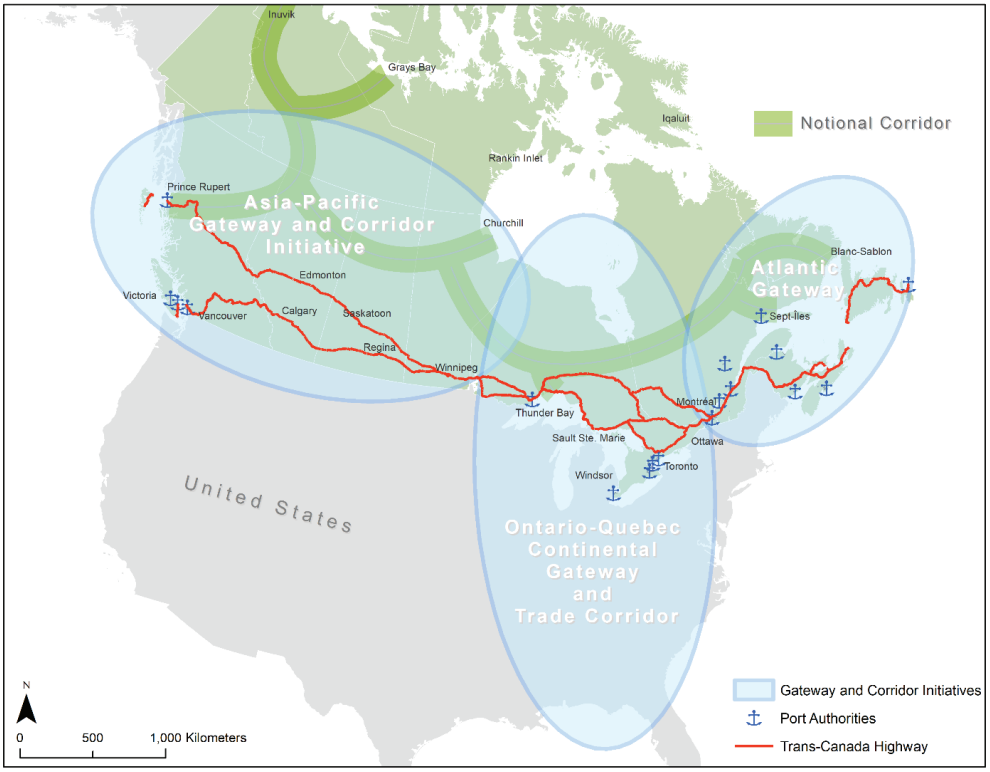
We find that a large-scale corridor concept is challenging to conceive, in both theory and practice, for mid- and northern Canada. We recommend a segmented corridor approach by focusing on those development initiatives that are already gaining public acceptance, and that communities have identified as key priorities, such as digital infrastructure. One early priority could be the digitization of highways and roadways to enhance safety while travelling and digitally connect communities. As such, a corridor approach must reflect a holistic strategy addressing the existing challenges related to the infrastructure gap in mid- and northern Canada which contributes to problems around unreliable transportation pathways, digital connectivity, food insecurity, inadequate housing and lack of healthcare and education.

INTRODUCTION

Canada, like other countries across the globe, faces immense pressures to maintain global competitiveness amidst various external factors, such as rising energy costs and other economic, social and environmental challenges stemming, in part, from climate change and the post-COVID-19 pandemic recovery. Throughout the last two years, both domestic and global supply-chain disruptions were brought on by the public health and safety restrictions due to the pandemic, environmental disasters, which appear to be increasing in severity and frequency due to climate change, and the invasion of Ukraine by Russian troops on February 24, 2022. Combined, the consequences of these events and challenges emphasize not only the fragility of Canada's supply chains due to a lack of redundancies, but also the impact of disruptions in many northern, remote and other communities struggling with issues of equitable healthcare access, social services, employment and education opportunities and reliable transportation due to a lack of essential infrastructure in mid- and northern Canada (Fellows et al. 2022; Koch 2021).

The original CNC concept encompasses a series of multi-modal rights-of-way across mid- and northern Canada to support efficient, timely and integrated infrastructure development, including combinations of road, rail, transmission, pipeline, communications, port and airport infrastructure. The term 'corridor concept' indicates that the Northern Corridor is at a conceptual stage of investigation focused on informing future policy and infrastructure development rather than assuring its development; its realization is not assumed, and investigation of the concept may determine that such a development, as currently imagined, is not feasible. The notional corridor route, illustrated in Figure 1, represents a series of interconnected corridors across Canada's middle and northern regions reaching all three coasts and connecting with the existing southern transportation corridors. We routinely use the term "the North" in this report; this denotes not just northern Canada but the northern portions of the provinces of BC, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, and Newfoundland and Labrador — this region is also sometimes referred to as "mid-Canada". However, for the CNC to fulfill its vision of a national infrastructure corridor, all rights- and stakeholders must be involved in the conversation. The concept of a corridor encompasses more than linear (e.g., road- or railways) or point-to-point infrastructure (e.g., air- and marine ports); it must also consider the social and environmental impacts that emerge as a consequence of increased connectivity in the North. As such, we aimed to include a broad variety of rights- and stakeholders in our Stakeholder Engagement Program to capture as many corridor dimensions as possible.

Figure 1: The Gateway and Corridor Initiatives



Source: Map prepared by Munzur (2021) — republished with permission.

The CNC Research Program involves three key elements comprised of research studies on eight thematic key issues (strategic and trade dimensions, legal and regulatory issues, organization and governance, geography and engineering, economic outcomes, social benefits and costs and environmental impacts); seventeen virtual roundtables with stakeholders from various governmental levels, industry and NGOs; and eighteen community engagement sessions held across mid- and northern Canada to share knowledge and gather feedback from northern residents on the CNC concept. One of the core research goals was to actively pursue and include northern voices in the research. This report is focused on the roundtable component of the project.[2] Our research, in contrast to previous studies on corridor development, considers a variety of research areas to better understand the implications, feasibility, desirability and acceptability of a CNC. For this purpose, we held a series of seventeen virtual roundtables between January and June 2022. The sessions were attended by stakeholder groups in government, industry, business, the non-profit sector, Indigenous governments and Indigenous advocacy organizations. The research is a timely contribution to support rights- and stakeholders in making informed choices about infrastructure development and regional connectivity while enhancing the academic information base about the potential of a corridor strategy for Canada. Furthermore, by considering the potential benefits and challenges of a CNC for governments, industry and communities, we can provide insights and recommendations for

[2] A summary of the community engagement activities and results is provided in a separate report (to be published following this report) and the various research studies have been published and are available on the CNC website: www.canadiancorridor.ca.

policy development, planning and implementation (Fellows et al. 2020; Sulzenko and Fellows 2016).

Historically, linear infrastructure such as the TransCanada Highway and the Canadian Pacific Railway was built in the southern portions of the country, focusing on connectivity between east and west and with the United States to the south (Eden and Appel Molot 1993). More recently, the Standing Senate Committee on Banking Trade and Commerce (2017, 12) identified a northern corridor as a long-term vision that would "enable the federal government to address a range of pressing issues with Canada's transportation systems" and urged the federal government to seize the opportunity of a potential corridor as it "would transform Canada's transportation infrastructure." We argue that the various geopolitical shifts, risks and opportunities, combined with factors such as climate change and energy transitions, call for a long-term, integrated and strategic approach to maintain Canada's global competitiveness and to enhance the resiliency of the country's transportation network.

The Stakeholder[3] Engagement Program conducted as part of the CNC Research Program addresses three key questions: 1) what key gaps in infrastructure and infrastructure policy persist, according to potential rights- and stakeholders? 2) What are the potential impacts, challenges and opportunities of the CNC according to those rights- and stakeholders? 3) Which factors and conditions would make corridor development acceptable or unacceptable for a given rights- or stakeholder? The central component of the Stakeholder Engagement Program is a series of seventeen virtual roundtables accompanied by qualitative data collection. The roundtables are similar to focus group discussions, a research method that centres around researcher-facilitated group discussions as a mechanism of meaning-making and data collection (Morgan 2003). Roundtable discussions focused on a broad spectrum of topics related to infrastructure, transportation and connectivity across mid- and northern Canada, such as environmental, social and national security concerns, regional and economic development as well as implications of current legal and regulatory frameworks, such as environmental impact assessments. Our goal was to bring together diverse voices and perspectives from across mid- and northern Canada to discuss the opportunities, challenges and implications of a CNC, and to ensure that any topics not covered in our foundational theoretical work received adequate attention. As such, outcomes of roundtable discussions not only inform our research but also open new research avenues to pursue in the future.

Multi-modal corridors for the movement of people, goods, services and information have been successfully utilized in other jurisdictions such as Australia (Satchwell 2023), to address the types of geographic, economic, political, legal, cultural and social challenges associated with the current infrastructure approach that prevails in Canada. The latter is characterized by one-off, piecemeal, short-term and unintegrated infrastructure projects. The result is greater uncertainty, higher costs and loss of many collateral benefits with consequent risks to our social and economic prosperity, security and unity. The CNC potentially expands and diversifies international and national trade opportunities and

[3] For the purpose of this study, 'stakeholder(s)' is defined as a group or individual with an active or potential interest in the corridor concept, while 'rightsholder(s)' refers more specifically to those Indigenous communities and Peoples (encompassing First Nations, Inuit and Métis) who hold particular rights regarding, for example, land access and title. The distinction is important, as the rights and sovereignty of the latter group are constitutionally protected, which is not the case with the former.

increases overall income and employment growth (Fellows and Tombe 2018b), assists with northern security and sovereignty goals (Lackenbauer and Koch 2021), and addresses constraints within the existing southern infrastructure grid (Rodrigue 2021).[4]

This report first offers a brief research context to provide insight into the theoretical and conceptual underpinnings of the CNC that have framed our roundtable discussions. This is followed by a methodological overview of the Stakeholder Engagement Program, data collection and method of analysis. We then report key results, divided into four subthemes: 1) infrastructure needs and priorities; 2) challenges, barriers and lessons learned from previous infrastructure initiatives; 3) expected benefits of a CNC; 4) trade-offs and conditions for CNC development. The discussion offers insight into the potential policy implications of pursuing or not pursuing a CNC based on participant perspectives followed by ten policy recommendations. The conclusion offers a summary of key findings and a discussion of future research avenues that also support informed policymaking.

THE CANADIAN NORTHERN CORRIDOR CONCEPT IN RETROSPECT

By the late 1950s, the Government of Canada recognized the need to open the North to gain access to its natural resources and to build a connection between the Northwest Territories and Yukon with the southern provinces. In his Opening Campaign Speech, John Diefenbaker (1958) declared that "I see a new Canada — a Canada of the North [. . .] We will aid in a project which, while not self-liquidating, will lead to the development of the national resources for the opening of Canada's Northland." Canada's future was perceived to be closely interlinked with natural resources, transportation and infrastructure development to promote economic growth, which would also serve its security and defense interests during the Cold War. In 1967, Richard Rohmer, a former Canadian Air Force Pilot, proposed a "Mid-Canada Development Corridor" (Rohmer 1967). Geographically, this corridor was defined as "that part of mainland Canada which is north of the contiguous belt of urban and rural settlement, and south of a generalized line which forms the northern limit of the tree zone" (Rohmer 1967, 2). This zone was deemed ideal for human settlement as it benefitted from a sub-arctic climate with short but warm summers and uninterrupted sunlight during the summer months, which would benefit the growing of crops.

Rohmer's corridor was not realized. The main regions it covered were long regarded as a "remote fringe area," and no further development plans for a northern corridor had been made by the 1980s (Weller 1984, 199). What stands out from these early studies on the potential of a Mid-Canada Development Corridor is the nearly exclusive focus on geological and geographical factors such as existing infrastructure (railways; roads; airways), demographics and geological features. These geophysical and socio-economic features are crucial to better understand northern regional circumstances and the potential of those regions for infrastructure development. However, previous research did not consider the impact and consequences of such development for residents, and in particular Indigenous livelihoods, as well as the impact on the northern and Arctic environment, which becomes increasingly fragile as climate change progresses.

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[4] All CNC research publications are available at https://www.canadiancorridor.ca/research-publications/.

From an academic perspective, transportation corridors, or so-called "mega corridors," have a long tradition in disciplines related to transport geography, and urban and spatial planning (Priemus and Zonneveld 2003). Corridors related to infrastructure and transportation have been discussed in a variety of geographical contexts, including the Lamu Port-South Sudan-Ethiopia-Transport (LAPSSET) corridor in East Africa;[5] the Belt and Road Initiative (BRI) in Asia (Gong 2019); the Pilbara Corridor in Australia (Satchwell 2023) and transportation corridors in the European Union (EU).[6] In Canada, the federal government indicated a renewed interest in the corridor concept in 2017 after the publication of a report by the Standing Senate Committee on Banking, Trade and Commerce (2016) examining the internal trade barriers between provinces and territories. The committee "was angered to hear that some of the recently negotiated international trade agreements would make it easier for international businesses to trade with Canada than it currently is for Canadian businesses in one province/ territory to trade with other provinces/territories" (Standing Senate Committee on Banking, Trade and Commerce 2016, iii).

Following this condemning stance, the committee produced another report in 2017 examining the potential and next steps for a national corridor, including a Canadian Northern Corridor (Standing Senate Committee on Banking Trade and Commerce 2017). Fellows and Sulzenko testified that the governance structure of a CNC is a critical component, and proposed that the federal government adopt a leadership role in coordinating different interests among all rights- and stakeholders, but without "trying to direct those interests" (Standing Senate Committee on Banking Trade and Commerce 2017, 8). Sulzenko and Koch (2020, 16) found later that, "although the federal government, with its jurisdictional responsibility for transportation that crosses provincial and territorial boundaries, could take a lead role in the CNC, provincial and territorial governments as well as Indigenous Peoples need to be considered equal partners as they are the primary custodians of their respective lands."

Canada recognizes the "longstanding inequalities in transportation, energy, communications, employment, community infrastructure, health and education," and that previous "made in Ottawa policies" to address these inequalities have not been successful (Crown-Indigenous Relations and Northern Affairs Canada 2019, 3). Instead, the Arctic and Northern Policy Framework (ANPF), published in 2019, offers a ground-breaking approach, supporting Canada's path to Truth and Reconciliation,[7] by realizing and implementing a shared vision for the North in close cooperation with Inuit, First Nations and Métis communities in northern Canada. We argue that a CNC could contribute to this stated goal of creating equity between all regions across north and south in terms of connectivity and accessibility to essential services while also offering a concrete pathway for improving transportation and infrastructure across mid- and northern Canada.

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5 For a critical discussion of the Lamu Port-South Sudan-Ethiopia-Transport (LAPSSET) corridor, see Enns and Bersaglio (2020) and Lesutis (2020).

6 For a discussion of the trans-European transport network (TEN-T) and in particular the Scandinavian-Mediterranean (ScanMed) corridor, see Öberg et al. (2016).

7 In 2015, the Truth and Reconciliation Commission published a final report on the principles of Truth and Reconciliation in Canada (Truth and Reconciliation Commission of Canada 2015).

STAKEHOLDER ENGAGEMENT METHODOLOGY

To investigate the feasibility, desirability and acceptability of a CNC, this report presents a thematic content analysis aggregating the qualitative data collected at seventeen virtual CNC roundtable engagement sessions that took place from January to June 2022.[8] Roundtable discussions were held with various rights- and stakeholders, including Indigenous, municipal, provincial and territorial governments, industry stakeholders (transportation, energy, telecommunications, tourism, natural resources and Indigenous funding and financing) as well as social and environmental NGOs.[9] The structure of these roundtables resembled a focus group setting, a research method that centres on researcher-facilitated group discussions as a mechanism of meaning-making and data collection (Morgan 2003).

Focus groups primarily intend to collect in-depth qualitative data about a certain topic rather than to provide a statistically representative sample of a certain population (e.g., compared to survey-based research). Onwuegbuzie et al. (2009) suggest that "well-designed focus groups usually last between one and two hours and consist of between six and twelve participants". To achieve these participation numbers, authors suggest over-recruitment of at least 20 percent to 50 percent. A total of 2,805 invitations went out to stakeholders across all roundtables, and Figure 2 shows the distribution of invitations for each roundtable event. Figure 3 shows the distribution of participation for each stakeholder group. A total of 113 research participants joined our roundtable discussions, with the highest participation number (nineteen) in the Municipal Governments West and the lowest (one) in the Indigenous Governments West roundtables (Figure 3).

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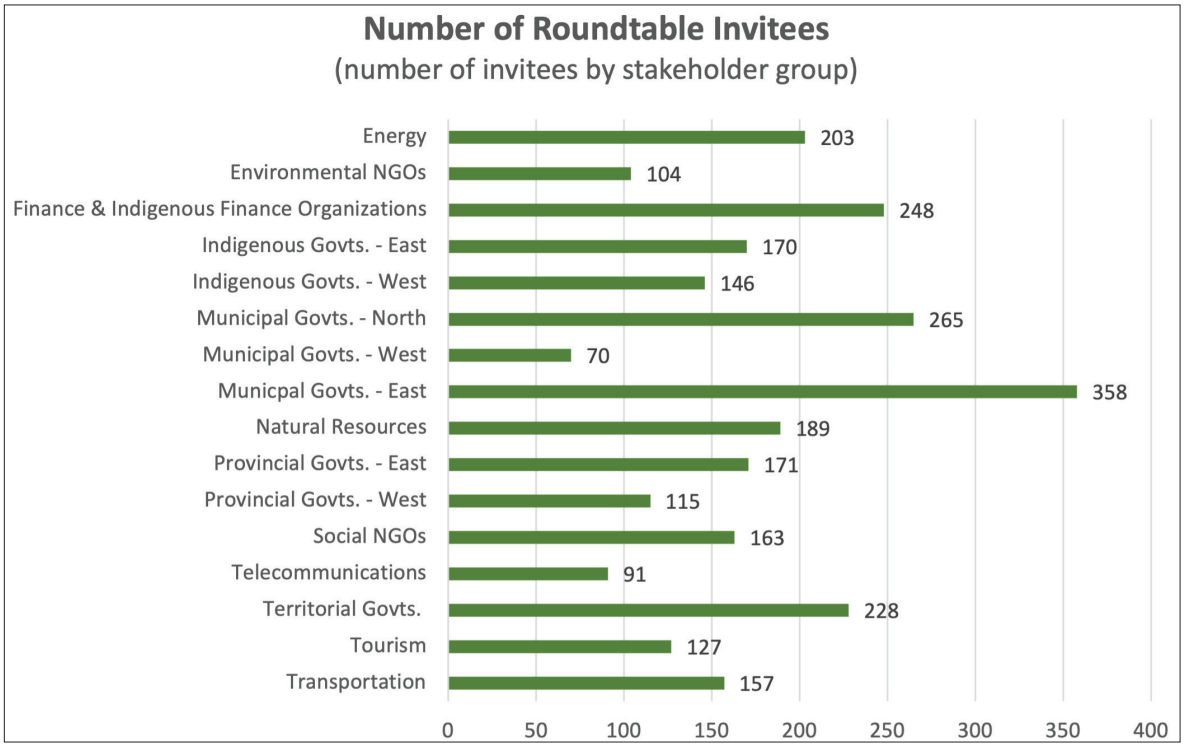
[8] The Canadian Northern Corridor Stakeholder Engagement Program was reviewed and approved by the Conjoint Faculties Research Ethics Board (CFREB), University of Calgary, in accordance with the Tri-Council Policy Statement on the Ethical Conduct for Research Involving Humans (TCPS).

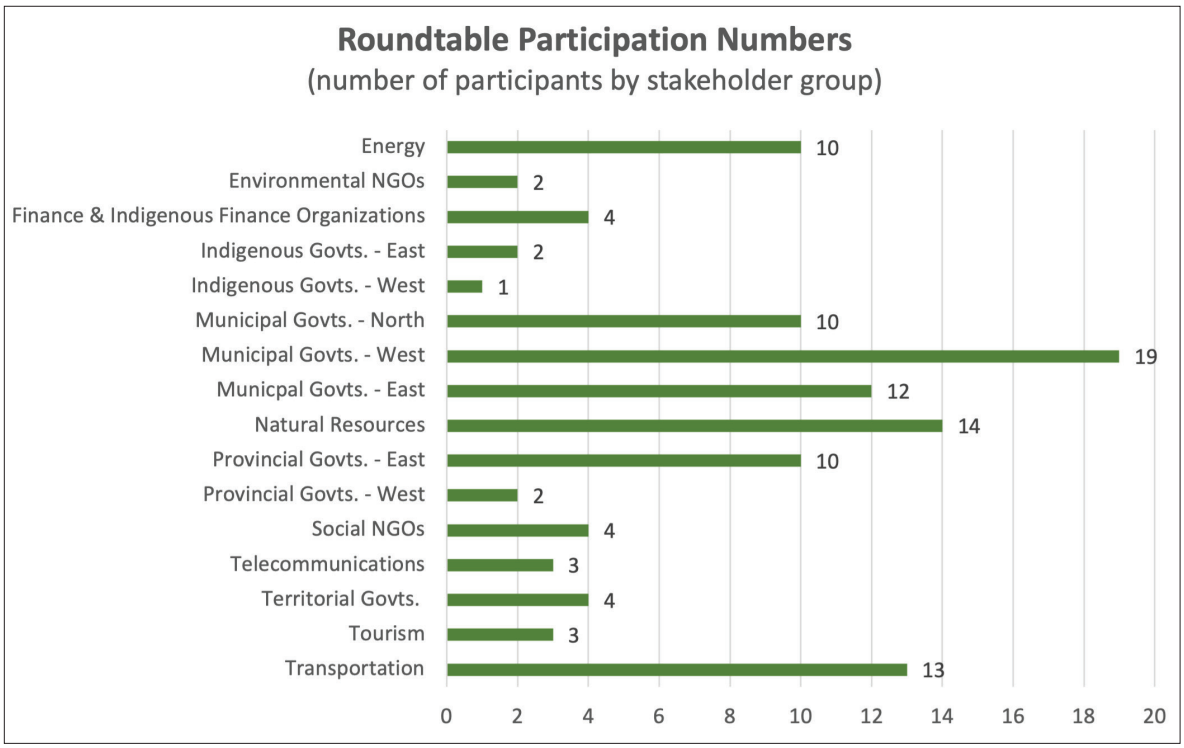
[9] Appropriate stakeholder groupings were identified based on a combination of internal discussion with our Scientific and External Advisory Committees, coordination with our engagement and communications consultants and outreach to various stakeholders. In determining appropriate groupings, the CNC Research Program leadership team factored in feedback we received during conference presentations and other outreach activities undertaken early in our research program. Specific examples include: program participation in Senate hearings (Ottawa, ON, 2016); meetings with federal stakeholders (Ottawa ON, 2016); the Pipeline Gridlock conference (Calgary, AB, 2016); the Opportunities North Conference (Yellowknife, NWT, 2016); the Northern Exposure Conference (St. John's, NFLD, 2017); the Northern Lights Conference (Ottawa, ON, 2018); the Energy and Mines Ministers' conference (Iqaluit, NU, 2018); Consulting Engineers of Alberta — Transportation Conference (Red Deer, AB, 2019); presentation to the Northern Transportation Advocacy Bureau (Grand Prairie, AB, via Teleconference, 2019); National All-Chiefs Energy Summit (Calgary, AB, 2019); Arctic Oil and Gas Symposium (Online, 2020); Arctic Energy and Resource Symposium (Online, 2021).

Figure 2: Distribution of Invitees by Stakeholder Group



Note: We held two separate roundtables for the Social NGOs, but the number represented here is the combined number of invitations.

Figure 3: Distribution of Participation by Stakeholder Group



Note: We held two separate roundtables for the Social NGOs, but the number here represents the combined participation. For the Tourism sector, we held a separate meeting with industry stakeholders in addition to the official roundtable meeting. The number here reflects these two meetings.

Focus groups are a participatory research method that, "unlike one-to-one interviews where the power to control content, pace and tone of the topics lies with the interviewer, the number of participants in a focus group and their ability to pose questions and respond to others in the group leads to a shift in the power away from the moderator" (Robinson 2019). As a result, research participants may feel empowered to express their views in a temporary safe and supportive environment. In this social interaction, there is the risk that participants may choose to refrain from disclosing their true beliefs and perspectives on a certain topic to other participants and researchers. Acknowledging this limitation, however, does not invalidate the contribution of focus group research, as it enables researchers to observe how people choose to present and articulate their views on certain topics in a public group setting. The focus group format allowed the CNC research team to guide and focus discussions through the use of prompts informed by the team's existing knowledge of rights- and stakeholder interests and concerns. Prompts, rather than standardized questions, also allowed for new issues, concerns and ideas to emerge as research participants interacted with the research team and their fellow participants. This enabled participants to frame and articulate their responses according to their understanding of the CNC.

Each roundtable session followed the same meeting mechanics, with minor variations where necessary, depending on the number of participants. This implied adjusting the time of each roundtable session (between 1.5 and three hours) and using virtual discussion tools, mainly Google Jamboard®. From one to twenty participants per session joined from a variety of locations across Canada. The discussions were held via Zoom Video Communications®, and access information was provided to each registered participant before each meeting. During the meeting, when participant numbers were five and above, the facilitators used the online digital interactive whiteboard Jamboard®. Zoom meetings were recorded and stored for thirty days for notetaking purposes.

Participants were invited to introduce themselves, but anonymity was and is ensured in accord with the ethics protocol approved by the University of Calgary Conjoint Faculties Research Ethics Board. No demographic information was collected from participants other than for registration purposes (which included name and surname as well as their organization). After the initial round of introductions, a UCalgary researcher gave a brief presentation about the CNC Research Program, the CNC concept and the Engagement Program. Our research questions pertain to the identification of key infrastructure gaps, including in infrastructure policy, the potential impacts, challenges and opportunities of the CNC and the factors and conditions that would render corridor development acceptable or unacceptable. Based on these research questions, we followed a discussion format applied in each roundtable, centered around infrastructure needs and priorities; challenges, barriers and lessons learned; expected benefits and governance considerations; and trade-offs (Table 1).

Table 1: Key Topics and Questions Presented to Roundtable Participants

	Topic	Key Questions
1.	**Needs and Priorities**	• What are your region's most pressing needs and/or key priorities?
2.	**Challenges, Barriers and Lessons Learned**	• What do you see as the most significant barriers or challenges for your region to realizing the connective infrastructure that would support your community's needs and priorities? • What lessons have you learned from your experience with infrastructure planning and development?
3.	**Expected Benefits and Governance Considerations**	• What benefits would your region expect from the development of corridors or similar large-scale, national infrastructure programs?
4.	**Trade-Offs**	• What sort of trade-offs might there be for your region related to corridor development?

Each virtual roundtable was attended by two research-team members from the School of Public Policy (a presenter and a notetaker) and two discussion facilitators from Cascade Projects, an Indigenous-owned consulting firm. Qualitative fieldnotes provide "non-textual or auditory information about interviews and focus groups, useful in understanding participant meaning" (Phillippi and Lauderdale 2018). They also offer important in-vivo data reflecting the specific language of the participants and allowing the research team an insight into how participants interpret and understand key issues and concepts, informing the subsequent coding process and analysis of the data (Saldaña 2014).

Following each discussion, roundtable participants were invited to provide feedback. The research team, in collaboration with Cascade, prepared a summary report for each session outlining meeting details (e.g., outreach activities and participation numbers) and a high-level overview of key topics discussed in the session to support the analysis of the researchers. After each roundtable session, the research team prepared fieldnotes and brief analytical memos to identify key themes and topics, which are presented in the results of this report. Where applicable, zoom chat protocols and screenshots of the Jamboards® are included in the research material.

The fieldnotes and chat protocols were systematically categorized with the support of qualitative research data analysis software NVivo12® to help extract key excerpts from the material. We conducted a deductive qualitative analysis of the collected roundtable data, supported by a pre-determined codebook organized around four main themes: connectivity, corridor development, benefits of corridors and concerns about corridors.

Table 2: Qualitative Codebook — Thematic Overview

Connectivity	Corridor Development	Benefits of Corridors	Concerns about Corridors
Movement of goods	Desire for corridors	Economic benefits	Economic concern
Movement of people	Rejection of corridors	Environmental benefits	Environmental concerns
Digital connectivity	CNC as a national vision	Social benefits	Social concerns
Stakeholder relationships and connections	Trade-offs and conditions for corridor development	Security and safety benefits	Security and safety concerns
Existing hard and soft infrastructure and related issues (e.g., access to clean drinking water; electricity)	Challenges of corridor development		
Canada's role in the world			

Deductive coding follows a top-down approach by starting with a set of pre-determined codes to find the relevant excerpts in the material and categorize them in accordance with the existing codes (see Saldaña 2014). We chose this method to make sure that we gather relevant material from the discussion pertaining to corridor or infrastructure development, including contextual discussions, which often broadened the discussion. While most discussions are relevant to our research, the deductive approach helps in removing those excerpts that are irrelevant to the research topic (e.g., administrative discussions; off-topic conversations). The sticky notes from the Jamboards were excluded from the coding for two main reasons: their topics often repeat in the transcribed discussion, and sometimes they do not provide enough background information. The Jamboards function as supporting material to verify the general sentiment captured in the fieldnotes.

WHAT WE HEARD

1. INFRASTRUCTURE NEEDS AND PRIORITIES ACROSS MID- AND NORTHERN CANADA

The first sub-section provides an overview of the infrastructure needs and priorities across mid- and northern Canada in response to the first research question, which pertains to the identification of key infrastructure gaps across mid- and northern Canada. While roundtable participants identified several needs, we emphasize the role of digital connectivity, which was highlighted as a priority across all roundtables. Furthermore, participants routinely stated that Canada lacks a national infrastructure vision or strategy, which contributes to and exacerbates the infrastructure gap between north and south.

Infrastructure Needs and Priorities Vary Across Mid- and Northern Canada, but Digital Connectivity is a Shared Challenge

> "During the pandemic year, we've had some issues with regard to internet connectivity, which placed our students and community at a disadvantage with regard to education and post-secondary learning. We certainly have a lot of grounds to make [up] with respect to having equivalent IT support within our nation, and not just our nation, but the surrounding nations as well."
>
> — Participant from an Indigenous government – West.

The consequences stemming from a lack of high-speed internet[10] were mentioned throughout all roundtables. Roundtable participants pointed to the intersectional characteristics of the digital divide, which means the (un)availability of internet access also affects health and learning outcomes due to the (in)ability to participate in online distance education and to avail of online physical and mental health services. Furthermore, without high-speed internet access, businesses and other institutions are left further behind, widening the infrastructure gap between north and south. The broad consensus across roundtables on the need for better internet connections could on the one hand be emphasized through the nature of our virtual engagement. For example, several participants cited internet problems and their inability to switch on their cameras without losing access to the video stream. On the other hand, many work-from-home orders were still in place at the beginning of 2022 due to the COVID-19 pandemic, rendering residential internet access essential to carry out work and study tasks.

Beyond these issues of individual participants, digital connectivity and the essential requirement to have online access to a variety of everyday activities were highlighted by participants from all regions. Notably, in the territories and particularly in Nunavut, no high-speed internet is available, and residents rely on satellite networks (Koch 2022). Delivering high-speed internet access to Nunavut, for example, "would help shrink other gaps in well-being that are intensified by territory's geographic barriers and relative isolation" (Nunavut Tunngavik 2020, 146). However, digital connectivity is not only an issue in the Canadian North and Arctic, but also within remote communities across the provinces where households face difficulties connecting to the existing backbone network due to a lack of last-mile connections to the home. A stakeholder from the telecommunications sector stated:

> "We have to get the last-mile issue out on the table, and I am sure it is on the back of everybody's minds. We have to talk about it explicitly, that we always have a problem distributing internet or communication technology in sparsely populated regions across Canada. [. . .] The root of the problem is economics; it's never going to be commercially viable to build the infrastructure to cover this last mile in a sparsely populated region. So it falls to local groups and municipalities to build that infrastructure because they recognize the value and the importance to the community of this type of infrastructure."
>
> — Participant from the telecommunications sector

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[10] High-speed internet is currently defined as 50 Mbps download/10 Mbps upload speeds, with access to unlimited data, according to the Canadian Radio-television and Telecommunications Commission (CRTC). Further information is available from CRTC: https://crtc.gc.ca/eng/internet/internet.htm.

A municipal stakeholder from western Canada highlighted that the incumbent telecommunications providers are "only interested in particular areas, and outside those areas, connectivity remains poor." Furthermore, participants also emphasized intersectional digital inequities that create or exacerbate other issues, such as a lack of access to online education or healthcare, conducting business transactions and staying connected via mobile networks in emergencies. While many remote and/or northern communities have some levels of internet access, comparisons were frequently made with the superior existing networks in southern urban centres, indicating the persisting urban/rural and northern/southern digital divides within Canada.[11]

Besides digital connectivity, participants listed a variety of other infrastructure needs and priorities, which ranged from several areas related to both physical and soft infrastructure (Table 3).

Table 3: Shared Infrastructure Priorities and Concerns across Roundtables.

Infrastructure Priorities	Common concerns
Digital Connectivity.	High subscription costs and lack of high-speed internet in remote and northern communities.
Efficient and resilient transportation infrastructure to move goods and people (e.g., roads; railways; airports; ports and harbours).	Unsafe roads, reliance on seasonal winter roads, extreme weather events rendering barge services unreliable in terms of scheduled deliveries, and lack of railway access as a transportation alternative.
Infrastructure that serves more than one purpose (e.g., resource development and community well-being).	Concerns about infrastructure development and the impact on the environment, including wildlife and ecosystems (e.g., permafrost; boreal forest). Shared agreement that Canada's environmental footprint needs to be reduced; questionable that a CNC can contribute to that.
Energy security (electrification, energy autonomy via access to renewable energy, pipeline infrastructure). E.g., the development of a "solar corridor" or "net-zero power grid."	Concerns about high utility costs, particularly in northern regions. Goal to reduce diesel dependency by improving access to energy. Unreliable power supply in the North is a common concern.
Access to clean drinking water.	Inadequate or lack of wastewater and sewage facilities.
Housing quality and availability.	The northern housing stock is in disrepair; health hazards.
Healthcare and long-term care facilities, including mental health services.	Lack of healthcare facilities; long travel times to the nearest regional "hub" to access hospital services.
Education (post-secondary and trades) and training.	Residents in remote and northern communities have to move to urban centres; 'brain drain' within communities.
Food security and maintaining traditional activities such as hunting and trapping (food autonomy).	High costs and unaffordable groceries in the North.
Human resources and capacities (local labor).	The labour force for specialized tasks must be 'imported' from the south.
Access to culture and maintenance of traditional practices, including traditional languages.	Concern about losing cultural heritage if a northern corridor is realized — easier access for southerners to northern communities.

[11] For further discussion of the digital divide in Canada, see Koch (2022).

While roundtable participants pointed out varying needs across Canada's provinces and territories, many discussions revolved around soft infrastructure, comprising housing, education, healthcare and food security. It thus became clear that the concept of a CNC must include more than transportation infrastructure, and must also offer solutions for specific community concerns to improve northern livelihoods. Topics such as food and energy security were particularly discussed by representatives who have experience living and/or working in the Northwest Territories and Nunavut. High utility and grocery prices were mentioned as key issues that affect households. Furthermore, access to clean drinking water was a main issue for remote communities across all territories and provinces, particularly among Indigenous participants.

Various industry representatives spoke about the need to transition to renewable energy, including in the energy and natural resources roundtable. While these representatives did recognize Canada's wealth of natural resources, many participants demanded more action from the federal government to focus on climate change mitigation and adaptation strategies. A roundtable participant from the energy sector raised the concept of energy justice, referring to the geographic and socio-economic circumstances that must be considered by policymakers to inform a just energy transition for all Canadians.

There was no disagreement among participants that climate change affects livelihoods in Canada. Environmental disasters have already disrupted supply chains, and there was a shared perception that the frequency of flooding and wildfires is increasing. However, opinions differed on how to achieve energy security and diversification. Participants proposed several ideas, such as the establishment of a "solar corridor," by making use of photovoltaic technology to deliver electricity to northern and remote communities. Others, from the natural resource roundtable, suggested a focus on nuclear technologies, such as small modular reactors. All participants shared the view that diesel-reliant communities need support to enhance their energy autonomy, for example by pursuing renewable energy solutions or by substituting diesel fuels with energy that has a lower carbon footprint, such as natural gas.

Improved transportation infrastructure in general was mentioned across most governmental and industry roundtables, including the tourism sector. However, for the tourism sector, improved access to northern and remote communities appears as a double-edged sword. On the one hand, representatives from the tourism sector indicated that remote destinations become accessible, which increases both safety for tourists and revenues for tourism businesses attracting more customers. On the other hand, the representative also pointed out that certain tour operators offer outdoor and remote wilderness experiences. A CNC could potentially grant access and diminish the remoteness factor of certain destinations, especially if road development was coupled with mining or forestry activity, rendering certain destinations less attractive for adventure-seeking clientele. Furthermore, the implementation framework of a potential CNC, according to the tourism industry representative, needs to eliminate any unintended consequences for the environment by ensuring the preservation of pristine conditions in protected areas, such as national parks.

In terms of the impact of development on the ecosystem and wildlife, environmental NGO representatives were the most outspoken critiques of a CNC. They expressed the perception that the CNC concept caters solely to industry needs, without sufficiently considering environmental impacts. At the same time, the participant recognized that certain types of development are inevitable and appreciated the idea of taking a strategic approach to development in northern Canada in the future, preferably in line with Canada's strategy to achieve net-zero emissions by 2050 (Government of Canada 2023). Environmental NGO stakeholders advocated strongly for locally driven projects to address local concerns and needs and also align with local environmental conditions. This suggestion of locally and community-driven development emerged across all roundtable discussions to certain extents, with the general suggestion to ensure Indigenous participation and support communities to advocate for their interests on different governmental levels. This, in general, was considered a solution to address the lack of northern voices in existing infrastructure policy frameworks and to support cooperation between rights- and stakeholders.

To Prepare for the Future, Canada Needs an Integrated Vision for Infrastructurez Development

> "How do we build infrastructure cathedrals where we understand intuitively that the economic benefits go beyond the immediate future? The federal government has the task to manage the concerns of investors, including preparing performance-based reports for regulators. We need some timeframes to make decisions [. . .], there is a bit of a clicking clock there, and we need some action and purposeful activities and momentum around these things."
>
> — Participant from the energy sector

Climate change, the post-pandemic recovery and Russia's invasion of Ukraine were some of the global issues referenced by roundtable participants to underline Canada's need for a long-term infrastructure strategy to address the infrastructure gap between north and south. To secure Canada's economic prosperity for the future, several research participants from government and industry advocated for the need to improve Canada's interprovincial/territorial and international trade opportunities, for example by supporting green investments in renewable energy. Recognizing the strengths of Canada's economy, which is traditionally based on natural resources, research participants, particularly in the western provinces, demanded improved east-west connections, for example via rail services that would also support Canada's tourism sector, and establish new northern port infrastructure to gain access to tidewater. Besides physical and digital connectivity, participants across all roundtables recognized the environmental consequences of climate change, such as the increased frequency of wildfires, flooding and mudslides, as a shared global challenge affecting livelihoods and businesses (Debortoli, Pearce, and Ford 2023).

Research participants identified the fragmentation of infrastructure development and investment efforts, instead of a nation-wide strategy to account for the needed investment to maintain and safeguard Canada's domestic and international trade, as one factor that contributes to the infrastructure gap in Canada. Sporadic investment efforts, as opposed to

a strategic and integrated funding approach, have placed certain regions at a disadvantage. Roundtable participants stated that, traditionally, infrastructure development in northern Canada is usually tied to some type of natural resource development project (e.g., a road to mining sites). However, these projects may sideline adjacent communities without considering local priorities, such as access to clean drinking water.

While governments stakeholders advocated for an integrated and long-term infrastructure strategy, they also pointed out that it is important to "balance the visionary side of it" with a concrete roadmap to advise rights- and stakeholders on concrete measures that would address local community priorities and contribute to the idea of an integrated corridor in mid- and northern Canada. This discussion was also closely tied to the potential governance framework of a CNC. During the 1950s and 1960s, the federal government invested substantially into large-scale infrastructure such as the Trans-Canada Highway and the St. Lawrence Seaway, which was also repeatedly emphasized by research participants, with the caveat that the federal government no longer spearheads such "visionary" projects. While emphasizing the role of the federal government in spearheading the idea of a CNC, research participants did emphasize the importance of Indigenous inclusion and participation in any type of infrastructure development, reflecting indirectly on the historical connection between "national infrastructure" and its contribution to the creation of the Canadian settler state through "violent economies of enslavement and dispossession here and elsewhere" (Cowen 2020, 471).

Throughout the roundtable discussions, several participants from industry and government referred to the CNC as a potential long-term vision for Canada and as an investment for future generations. This was the "infrastructure cathedrals" metaphor in the quote above; the participant aimed to emphasize the generational value of long-lasting infrastructure. Municipal and provincial government stakeholders addressed the potential utility of a northern corridor for future generations and to safeguard Canada's wealth and prosperity amidst climate change and geopolitical instability, a focus that was shared by various stakeholders from the transportation, energy and natural resource sectors as well. However, representatives from environmental NGOs were cautioning against a northern corridor in light of is environmental impacts.

Environmental NGO participants questioned whether the need for improved access across the North was an idea of southern-based stakeholders, alluding to a potential misconception that southern Canadians may have about Canada's northern population and its priorities. Participants clearly stated that development, as it currently takes place in Canada's southern population centres, does not meet the desires of northerners. At the same time, environmental NGO stakeholders criticized the current "piecemeal" approach, referring to a lacking strategic approach — which often results in unintentional consequences for northern communities. The Government of Canada has implemented climate- and infrastructure-related visions, such as its 2030 Emissions Reduction Plan (Government of Canada 2022a), which should be considered in the discussion about a northern corridor. However, a participant from the energy sector reminded that one-size fits all emissions-reductions plans may not work in all regions across Canada. For example, electrification is currently difficult to achieve in those communities that rely on diesel imports, particularly across Nunavut (Pinto and Gates 2022). Carbon capture and storage are solutions currently pursued in Canada, but approaches such as the use of off-shore

(The NetZero Project 2023) or under-ground facilities (Government of Alberta 2023), differ across Canada due to geological variations. Decarbonization thus needs to adopt a differentiated approach that takes into account local environmental circumstances.

A participant from a territorial government expressed that the development of a CNC policy framework is critical because too many projects have been delivered in "piecemeal approaches," which created unnecessary strains on local environments and communities without considering how existing infrastructure can be integrated into a comprehensive framework — which would help develop strategic infrastructure objectives across regions and aligned with community priorities. The participant also stated that "we have been lacking real federal leadership," and that, as a result, "provincial and territorial governments are doing what they can within their jurisdiction, but it doesn't add up to a strategic national corridor." The general sense among many government and industry roundtable participants was that the federal government should adopt a leadership role to support the national vision of a CNC through a funding and governance framework, which, however, is developed through a bottom-up approach. Inviting Indigenous, municipal, provincial/territorial and federal rights- and stakeholders to the same table is a condition for CNC development for participants from municipal and Indigenous governments.

> "Advancing integrated infrastructure projects and long-term infrastructure planning can improve efficiency, reduce bottlenecks and enhance resilience. There is also saving that can be accomplished through corridor development, both through regulatory measures as well as the actual construction of a corridor. For example, a corridor could imply a smaller environmental footprint and better integration with southern infrastructure networks. Better trade throughout all of Canada benefits all of Canada, not just the regions that are getting access to the new infrastructure, as long as we plan this carefully. Reducing project approval costs, regulatory approval delays and governance uncertainty are very important."
>
> — Participant from the transportation sector

2. CHALLENGES, BARRIERS AND LESSONS LEARNED FROM PREVIOUS INFRASTRUCTURE DEVELOPMENT INITIATIVES

In response to the first research question, which focuses on the key gaps in infrastructure policy, the next section focuses on the policy-related factors identified by research participants that have impeded infrastructure development in mid- and northern Canada. Furthermore, this section also addresses the barriers, such as a lack of cooperation, affecting the development and implementation of infrastructure-related policies, and the lessons learned that would help inform a potential CNC. In response to the second research question, to identify some of the key problems of the CNC concept, this section also addresses the issue of climate change, which was identified as a key issue for a potential CNC due to the increased hazardous environmental events affecting both physical infrastructure and supply chains across Canada.

Past Infrastructure Initiatives Have Been Insufficient to Address Key Challenges Faced by Residents in Mid- and Northern Canada Every Day

> There are many challenges [in the North]. Infrastructure poses challenges. Without proper support, people just treat the North as something that can be left, it can be a place where people come by, get some income and leave, whereas there are a lot of people who can truly enjoy the North, they could make it a permanent home."
>
> — Participant from a municipal government – North

The excerpt at the beginning of this section demonstrates the prevailing north-south inequality that is perceived across Canada, with consequences for the movement of people and goods as well as a lack of economic opportunities for residents. Participants expressed dissatisfaction with past infrastructure projects that, in their opinion, have catered too often to the resource needs of southerners living in metropolitan areas, resulting in a focus on natural resource development concentrating on investment returns rather than local community development. Participants across many government and industry roundtables frequently lamented the prevailing approach among project proponents of "importing" workers and expertise from the south rather than hiring from the existing labor force in local communities. At the same time, roundtable participants also acknowledged the persistent deficit of local training and education opportunities, further exacerbated by the lack of infrastructure such as adequate internet access.

The lack of essential infrastructure in mid- and northern Canada has created and exacerbated existing infrastructure inequities between north and south, such as the digital divide affecting rural and Indigenous communities (Koch 2022) or the underdeveloped trade infrastructure in the Northwest Territories and Nunavut, which increases the costs of goods (Fellows, Munzur, and Winter 2023). The result is a major impediment to the well-being of residents living in remote or northern locations that lack access to essential services such as clean drinking water (Patrick 2011) or healthcare (Oosterveer and Young 2015). While roundtable participants provided long lists of infrastructure needs, they also reiterated that these bottlenecks and gaps are the result of long-standing grievances and neglect by policymakers and private-sector actors to address northern infrastructure priorities such as housing, education and clean drinking water. It is important to recognize that participants continued expressing this sentiment of neglect despite the federal government's recognition that "what has been done before has not succeeded in building a strong, sustainable region where most people share in the opportunities expected by most Canadians (Crown-Indigenous Relations and Northern Affairs Canada 2019, 8).

A contributor to the infrastructure gap, according to one participant representing a territorial government, is that "territorial-federal assessment regulatory processes have actually become less streamlined over the years," and that there is a need to "get those streamlined again, as they have become something of a barrier to work proceeding at this point." A participant from the transportation sector shared that, particularly among international investors, Canada has become "unsafe" or a "high-risk area" due to the regulatory requirements, particularly for resource-related projects. This has increased investment uncertainty, and recent research shows that Canada's reputation as an attractive destination for infrastructure investments has declined, a perception that is supported by recent research (Mukesh, Mansell, and Fellows 2023).

Another aspect contributing to the infrastructure gap, according to one participant from a territorial government, is the "watered-down definition of the North" as used by the federal government, which treats all northern regions (across both provinces and the territories) equally, but without achieving equity through policies. The participant offered the example of the National Trade Corridors Fund, which included a component aimed to "address the transportation needs of Arctic and northern communities" (Government of Canada 2021). The geographic delineation included Yukon, the Northwest Territories, Nunavut, the northern extent of Labrador (including Nunatsiavut), Nunavik (Quebec), the Town of Churchill, the Port of Churchill and related infrastructure assets in northern Manitoba. The issue, as indicated by the roundtable participant, is that such broad infrastructure funding strategies can place the territories, with a smaller tax base, at a disadvantage, as they have to compete with more affluent municipalities in the provinces that have greater capacity and resources to participate in such federal funding calls.

Related to this issue, a roundtable participant from the energy sector referred to the principles of "fairness and equity" that need to be considered in policies that aim to address Canada's infrastructure gap between north and south. In Canada, many remote Indigenous communities "confront the 'heat-or-eat' dilemma, as energy costs are often significantly higher than urban centers, even though household incomes are often less than half of their urban counterparts" (Cambou and Poelzer 2022, 189). A potential CNC framework needs to account for the additional amount of time and resources that are required to achieve equity between north and south.

A Lack of Cooperation between Rights- and Stakeholders Has Contributed to Infrastructure Gaps and Bottlenecks

> The communities need to figure out a way to work together and get some of these things moving or not. But I think a lot of times governments are having different approaches; for example, they go and meet with individual communities, and who knows what promises are made to these individual communities and what deals are being done; I've seen this happening so many times, and I really feel that step one is for communities in regions where they traditionally work together to collectively get together and form a position, stick together and then deal with governments as a collective. [. . .]. Anyways, communities have to work together, and they have to do this on their own.
>
> — A participant from an Indigenous government - East

A lack of cooperation and collaboration between different rights- and stakeholders was generally seen as a major obstacle to coherent infrastructure development. Instead of working together and pooling resources, some participants from municipal and Indigenous communities spoke about the existing competition for certain types of provincial/territorial and federal funding programs available to both Indigenous and non-Indigenous communities to address common problems such as access to clean drinking water and healthcare. Participants from municipal governments in particular suggested reducing red tape and inviting effective cooperation between communities, where applicable, to join forces, to achieve not only a greater funding success rate but also better outcomes for entire regions when applying for federal or provincial/territorial funding.

Furthermore, a participant from the transportation sector pointed out that smaller communities, or communities with fewer capacities and resources, "may be pushed to the bottom of the list" in terms of funding priority and support from provincial/territorial/federal governments, as they may lack the capacity, local expertise and resources (e.g., time) to prepare funding applications for federal or provincial/territorial programs, which often require the collection and analysis of complex data. A participant in the western municipal roundtable stated that "being a small town makes it hard to access funding," and that "both levels of government don't care about us," referring to the perceived negligence of the provincial and federal governments when it comes to funding and infrastructure development. This was also echoed by a financial stakeholder who expressed that, when governments and companies are in control of the resources, they do not typically include communities in the planning and execution of development strategies and projects, and that these are generally treated "as an afterthought." A reason for this is the inadequate funding provided to enable meaningful participation, and the participant suggested granting development permits only when governments and private sector actors can demonstrate meaningful involvement and participation at the community level.

Capacity-sharing and cooperation between smaller, remote municipalities and Indigenous communities were generally welcomed by roundtable participants, but different governance structures between Indigenous and non-Indigenous communities (e.g., differences in election cycles and funding eligibility for federal resources) may adversely affect cooperation on the ground. While no immediate solutions to these issues were indicated by participants, a CNC was considered as a way for all rights- and stakeholders representing different levels of government to begin the discussion about northern infrastructure development and its challenges stemming from such regulatory and political factors. A participant representing a provincial government in western Canada also shared the opinion that there is a lack of information exchange between different levels of government, resulting in a lack of communication about planned infrastructure corridor initiatives in other provinces and territories. Participants across all governmental roundtables emphasized their willingness to share ideas and perspectives; however, they often stated that, to date, there are no fora or platforms available that would facilitate this cross-border and cross-governmental cooperation efficiently.

Infrastructure development, especially in the form of a pan-Canadian corridor, involves numerous rights- and stakeholders, and a participant from a western provincial government implied that existing institutions, such as the Council of the Federation,[12] alone may be insufficient to foster collaboration between all governmental stakeholders. The role of the Council of the Federation was rarely discussed among provincial and territorial participants. However, a member from a municipal government in western Canada expressed appreciation that some infrastructure-related issues (e.g., the lack of high-speed internet in remote communities) are similar across different regions. These shared experiences and perspectives could serve as a base for future collaboration. At the same time, a participant representing a provincial government also highlighted that, due to Canada's disparate trade rules across provinces, some investors find it more difficult

[12] "Established in 2003, the Council enables Premiers to work collaboratively to strengthen the Canadian federation by fostering a constructive relationship among the provinces and territories, and with the federal government. Premiers are supported by a small Secretariat located in Ottawa." For more information, see https://www.canadaspremiers.ca/.

to work across provinces than across different countries, and that opportunities must be provided for cooperation across provincial and territorial borders.

The Consequences of Climate Change Pose a Specific Challenge for Canada by Disrupting Supply Chains

> One thing would be network resiliency — renewal, redundancy and climate change all need to be considered. [. . .]. Washouts, seismic events, etc. can create disruptions in supply chains, and have in the past.
>
> — Participant from a territorial government

Participants from the transportation sector highlighted that environmental conditions across mid- and northern Canada are changing and becoming more volatile as temperatures increase due to climate change. Transportation infrastructure, such as railways, is increasingly at risk due to wildfires, flooding and mudslides across northern Canada. For example, service to the town of Churchill via the Hudson Bay Railway was disrupted for eighteen months between Amery and Churchill due to unprecedented flooding, raising the costs of groceries and fuel in affected communities (CBC News 2017). Furthermore, participants pointed to the risks of melting permafrost, not only increasing maintenance costs of existing infrastructure assets but also posing a safety hazard for users along roads and railways in northern Canada (Doré, Niu, and Brooks 2016). Delivery schedules of annual sealifts, essential for the supply of communities along the Mackenzie River and western Arctic coastal destinations, become increasingly unreliable due to volatile ice conditions leading to cancellations and delays (Brockman and Beers 2018).

Combined with the increased costs for shipping materials and equipment, stakeholders from the transportation sector pointed to the difficulty of transporting goods into northern and Arctic communities, which renders certain types of infrastructure development prohibitively expensive. Engineering and construction specifications must withstand extreme temperatures and require specialized foundations due to the presence of permafrost (Ford, Bell, and Couture 2016). The thaw of permafrost, noted by many industry stakeholders as a key issue in northern Canada, renders the ground unstable as the volume of soil reduces, "leading to subsidence and compaction," which require different foundation types or building designs (Ford, Bell, and Couture 2016, 161). This is a crucial aspect that also informs the feasibility of a corridor and the type of infrastructure that can be developed (Debortoli, Pearce, and Ford 2023). Pearce et al. (2020, 23) found that "permafrost degradation can pose a significant threat to natural and built infrastructure, extreme temperatures can affect the efficiency of electrical lines or pipelines and can damage railways over time, and extreme events such as forest fires can completely shut down areas with infrastructure or even key infrastructure hubs, grinding industrial systems to a halt." These issues were pointed out by several roundtable participants, with some arguing that a CNC would be impossible to accomplish, particularly for the private sector.

However, several participants from western Canada cited the devastating Pacific Northwest flooding event that disrupted supply chains in 2021, especially between Alberta and British Columbia, due to washed-out bridges and highways and further exacerbated COVID-19

pandemic-related strains on supplies and deliveries.[13] Participants used this event as an example to underline the fragility of Canada's supply-chain links and the importance of having options, for example by creating north-south connections and seriously considering Arctic marine port infrastructure to enhance the efficiency of exporting goods from Canada's North.

Furthermore, a participant from the energy sector highlighted that hydro power resources are usually located quite close to northern communities (for example in northern Quebec), but that these communities continue to rely on diesel and fossil fuels themselves. The participant stated that it is extremely important to not forget these communities during Canada's energy transition. The participant argued that diesel-reliant communities need to be connected to the southern electricity grids so that they can also benefit from the expected improvement, in terms of pollution, resilience, reliance and safety.[14] However, the high cost to connect remote communities to the southern electricity grid is a problem. In 2020, remote communities in the Northwest Territories, Nunavut, Quebec and Yukon continued to rely primarily on diesel for heating (Pembina Institute 2020). However, smaller and remote communities increasingly initiate and participate in local renewable energy projects such as the Whapmagoostui-Kuujjuaraapik Hybrid Power Plant Project (WKHPPP),[15] which aims to add wind energy to the diesel plant powering the dual community of Whapmagoostui and Kuujjuaraapik. The Kuujjuaraapik Whapmagoostui Renewable Energy Corporation (KWREC) is a newly formed Inuit/Cree energy corporation collaborating with Hydro Quebec Distribution, the owner of the diesel plant and sole distributor of electricity in Quebec, to supply the community with electricity provided by wind power in the summer. One participant from an Indigenous government shared that their community's electricity grid is powered with solar energy to try and reduce fossil fuel consumption, particularly for traditional activities. In addition, the local sawmill is heated with biomass, and the community aims to expand this into a community-wide district heating system to lower electricity costs. This presents one example of how remote and Indigenous communities improve their energy autonomy and resilience through microgrids.

3. EXPECTED BENEFITS OF A CNC

This section discusses some of the benefits roundtable participants identified, such as the CNC concept's potential to deliver a comprehensive funding and governance framework for Canada's North in response to the second research question, which focuses on identifying potential corridor opportunities.

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[13] For further information on the Pacific Northwest flooding event and its impact on Canadian supply chains, see https://www.cbc.ca/news/canada/british-columbia/bc-floods-media-briefing-1.6251722.

[14] Nunavut's diesel plants are reaching the end of their lifespans, creating hazards for local communities: https://nunatsiaq.com/stories/article/65674power_outage_power_plant_fire_leave_nunavut_community_cold/.

[15] For further information on the Whapmagoostui- Kuujjuaraapik Hybrid Power Plant Project, see: https://kwrec.ca/project-description/.

A CNC Could Deliver a Clear And Comprehensive Funding and Governance Framework for Canada to Support Future Infrastructure Development Initiatives

> We've been lacking real federal leadership in strategic infrastructure planning in central and northern Canada. As a result, provincial and territorial governments do what they can do within their jurisdictions, but it doesn't add up to a strategic national corridor and doesn't help connectivity or regulatory process integration and streamlining. We really need federal leadership for this type of corridor planning. It has to be a federal priority. It has to be collaborative. Everything right now is piecemeal and requires applying to individual programs, where bits and pieces just go all over the place and don't add up to anything larger.
>
> — A participant from a territorial government

While recognizing the long-term utility and visionary nature of a CNC, participants were adamant in their demands that any public or private potential infrastructure proponent will need to deliver concrete details in terms of funding and implementation that aligns with the regulatory and governmental frameworks under which a corridor could be developed. Furthermore, participants indicated that current impact assessments would likely be insufficient to address all the cascading economic, environmental and social impacts of such large-scale development as a CNC. In addition, participants were in doubt about whether existing impact assessments are appropriate or even designed for potential corridor proposals. A participant representing a provincial government expressed that the visionary side of the CNC must be balanced with the realities of the economic impact, costs and resources required to "make it real." Participants also suggested beginning with relatively simple steps that each jurisdiction could work towards with the common goal of creating an infrastructure network connecting north and south, east and west. A CNC roadmap, or a timeline with specific actions and budgetary considerations, would greatly support this endeavour, which could be developed in collaboration with all municipal, Indigenous, provincial and territorial rights- and stakeholders, to determine the fundamental goals and objectives of a CNC.

The realization of a CNC requires a unique multi-governmental approach based on the cooperation between all affected rights- and stakeholders to adequately reflect local circumstances and needs across all provinces and territories. While roundtable participants agreed that the federal government should adopt a leadership role in the development of a regulatory CNC framework, municipal and Indigenous government stakeholders identified themselves as key actors with the ability to inform provincial/territorial and federal decision-makers about local priorities.

While discussing the potential governance framework, the conversation also oftentimes turned to the question of funding and financing. In a roundtable held with the financing sector, participants explained that there is a lack of integration of projects in mid- and northern Canada as well as a lack of comprehensive planning; however, this is also perceived as a result of lacking resources within communities that could facilitate collaborative infrastructure planning and development. A suggestion was made to create a CNC task force that would support the creation of platforms and fora for meaningful engagement and cooperation between communities across mid- and northern Canada.

A Connected Infrastructure Network Supports Canada's Sustained Market Competitiveness through Optionality Amidst Geopolitical Crisis and the Impact of Climate Change on Supply Chains

> I like the fairness concept. How do we balance out Manitoba and Quebec, who have a blessing in hydro, and how do we share this with the country? In Ontario, we are supplying 60 percent of the largest population (in terms of provincial population) with electricity from nuclear power, but we can't really deliver large nuclear to Saskatchewan or even Alberta, because the energy grid is so small. But if you give us a northern corridor, we can bring technology to bear that would help on that front. We are used to dealing with north-south, most of the energy corridors are going north-south, but we need to figure out east-west.
>
> — Participant from the energy sector

Canada is at the cusp of an energy transition that follows international trends to reduce greenhouse gas (GHG) emissions through the electrification of industry and households. Renewable energy sources, as well as electrification, were key topics among research participants, especially in the context of Russia's invasion of Ukraine on February 23, 2022, which destabilized the energy supply in the EU and affected global market conditions for oil and gas.[16] The geopolitical tensions in Europe also sparked conversations about Canada's role as an energy exporter amidst Europe's transition towards cleaner alternatives, with general agreement among participants that Canada is currently unable to fulfill the gap left behind by the suspension of Russian gas imports into the EU due to a lack of suitable infrastructure, such as LNG ports (Christensen and Dusyk 2022).

It is not surprising that the majority of comments about electrification and energy security were made by participants from the energy sector; however, municipal government participants also highlighted the relevance of energy security in remote and northern communities. A participant from the Northwest Territories pointed out that there is one transmission line in Yellowknife, but if that fails, residents have to rely on diesel generators. The participant also shared that Canada currently has no interconnected electricity transmission system between the North and the South — rather, the North American power transmission grid forms connections between the U.S., including Alaska, and the provinces of Canada, but without connections into the Canadian territories.

As a result, many communities across the territories rely on diesel generators to fulfill their power demands. "Energy poverty" is a severe problem that creates further risks for the local population; for example, due to the interruption of water quality management and healthcare services (Maloney 2017). Renewable energy was considered a potential solution to improve energy security in the North and Arctic. One roundtable participant noted that the territories are "blessed" with an abundance of sunlight in the summer, which they would be able to feed into the southern electricity system, were connections available. Thus, the concept of a CNC was considered by energy sector participants as a way to finally establish an interconnected energy grid between north and south and to reduce the dependency of northern communities on diesel.

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[16] For a discussion on European energy policy since the Ukraine war, see Sturm (2022).

During discussions about Canada's current infrastructure development strategy, a participant from a municipal government in western Canada lamented that existing corridors may not connect, limiting their usefulness and accessibility for a lot of communities. Furthermore, participants observed a change of priority from east-west trade to cross-border trade with the U.S., which, according to a provincial government stakeholder in eastern Canada, "has put a disadvantage on northern Canada." Instead, participants suggest that the focus should be on north-south trade within Canada. The trade benefits of directing Canada's lens towards the territories, for example, were also highlighted by Fellows and Tombe (2018a, 7) who concluded that "Canada's national simulated GDP grows by nearly $6.5 billion, with $1.8 billion in GDP gains outside the territories." Fellows and Tombe (2018a, 7) found that "a cost reduction that benefits importers in the territories will also benefit exporters in the provinces (and vice versa)."

A participant representing a municipal government in western Canada stated that "in talking about retention of youth, the ability to deliver training and education in the area is needed." They gave the example of heavy-duty mechanics who are "direly low in availability," but "anytime someone has to be sent away for education, the majority will not return," meaning that critical education must be in situ. Participants generally agreed that a CNC would facilitate "attracting immigration or population transfers between southern and northern communities" and deliver the necessary infrastructure (in particular digital connectivity) to make mid- and northern Canada an attractive place to work.

Besides the emphasis on energy security and supply chains, participants also highlighted Canada's role in the Arctic, and its duty to defend its territorial and maritime sovereignty amidst Russian aggression in Ukraine and China's increased commercial interests in the Arctic. Canada's northern and Arctic regions are suffering from global warming at an enhanced rate compared to other regions, and participants agreed that Canada needs to adopt wide-ranging strategies (e.g., in terms of energy, trade and supply chains and climate change mitigation) to better prepare for the consequences of permafrost thaw and an increased frequency of severe weather events across mid- and northern Canada. Both affect critical infrastructure and supply chains. A CNC could be a part of the solution to ensure Canada's market competitiveness and preparedness for future disruptions due to increasingly volatile and disruptive environmental disasters.

4. TRADE-OFFS AND CONDITIONS FOR CNC DEVELOPMENT

This section answers the third research question by focusing on the acceptability of a CNC. The following discussion outlines conditions that must be met, according to roundtable participants, to support the idea of a CNC. Four key conditions were identified, related to Indigenous reconciliation, the integration of local expertise, the mitigation of environmental concerns and the inclusion of social provisions into a CNC framework.

Reconciliation with Indigenous Peoples is a Critical Aspect and Must Be Built into any Corridor Framework

> We do have to find a middle ground on the need for infrastructure development, but also prioritize Indigenous rights and how these projects affect Indigenous communities. But it's a very fine line. I would imagine we have to balance moving into the future. I would say [. . .] reconciliation and Indigenous economic inclusion are interlinked. I think that is the future.
>
> — A participant from the transportation sector

A stakeholder from the transportation sector emphasized that "having the voices of our First Nations communities around the table changes the conversation," as they provide direct insight into the barriers that contribute to the sustained inequity between Indigenous and non-Indigenous populations. The participant gave the example of a seemingly simple undertaking of riding a bus, which can become a significant safety issue in parts of the provinces and territories that lack an inter-regional public transit network. Most notable is the stretch of Highway 16 between Prince George and Prince Rupert in British Columbia that has been given the name "Highway of Tears" due to the number of missing and murdered Indigenous women and girls[17] (presumed to be a result of inadequate transit options, which leaves Indigenous girls and women no other choice than to hitchhike). This example illustrates how the absence of public transport creates risks to the lives of Indigenous women and girls.

A participant from the natural resources sector expressed that infrastructure "involves a lot more than a road, sustained power or communications." The presence or absence of infrastructure, including education, healthcare and housing, interlinks with public health and safety as well as the maintenance of adequate living standards. The participant also stated that the linkages between infrastructure and community development align with the ANPF. The ANPF was co-created in close collaboration with Indigenous Peoples across Canada's North, and is based on the "Key Principles Respecting the Government of Canada's Relationship with Indigenous Peoples",[18] which affirm that "the Government of Canada's approach to reconciliation is guided by the United Nations Declaration on the Rights of Indigenous Peoples, the Truth and Reconciliation Commission's Call to Action, constitutional values, and collaboration with Indigenous Peoples as well as provincial and territorial governments" (Department of Justice 2018). Similarly, the responses from roundtable participants suggest that any type of CNC governance framework must respond to the principles respecting the Government of Canada's Relationship with Indigenous Peoples.

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[17] The absence of Greyhound in the Canadian market was mentioned various times during our discussions. As of October 31, 2018, all Greyhound bus operations had ceased in western Canada, affecting routes in British Columbia and Alberta (Greyhound 2018), and effective 31 May 2021, Greyhound Canada suspended all remaining service offerings in Ontario and Quebec (Greyhound 2021). As a result of the 2018 cancellation of routes, the Native Women's Association of Canada issued a media release emphasizing that the lack of reliable public transportation "will significantly affect the safety of Indigenous women, girls, and gender-diverse people in remote and rural communities" (Native Women's Association of Canada 2018).

[18] https://www.justice.gc.ca/eng/csj-sjc/principles.pdf

Any Type of Infrastructure Development Requires the Integration of Local Expertise

> "It is very important that you do consult; we have the grassroots knowledge, we have coast-to-coast-coast networks where we are able to provide ground-level knowledge and expertise which respects the Indigenous perspective."
>
> — Participant from a social NGO

The roundtable discussions offered broad and diverse perspectives on key issues related to infrastructure development in mid- and northern Canada; however, a key message delivered during the discussion in various roundtables revolved around the idea that northern communities and residents ideally must act as project proponents themselves to ensure that any type of infrastructure development meets their priorities and needs. Several participants pointed out that the notional route of the CNC passes in the vicinity of many Indigenous communities (First Nations, Métis and Inuit), which raises different types of land rights and distinctive claims and implications relevant to the development of large-scale infrastructure. Metcalf (2023, 1) argues "once an asserted claim to Aboriginal title is legally recognized, consent, rather than merely consultation, is ordinarily required for activity on the land."

The impact of natural resources and related infrastructure development on the environment has been extensively studied in western science-based literature (Musetta-Lambert et al. 2018). Increasingly, western science incorporates Indigenous knowledge[19] (IK) and traditional ecological knowledge[20] (TEK) to better understand the effects of development on Indigenous livelihoods and traditional practices across Canada. These efforts are exemplified in the incorporation of IK into Canada's *Impact Assessment Act* (Government of Canada 2022b). The federal government states that "collaborating with Indigenous Peoples to include Indigenous Knowledge in assessments contributes to reconciliation and provides a more complete understanding of Indigenous worldviews, Indigenous cultures, the environment, environmental effects and valued components and the social, health and economic conditions of Indigenous Peoples" (Government of Canada 2022b).

Despite the recognition of IK and TEK within various policy domains, such as natural resource development and wildlife management, scholars find that there are significant shortcomings in integrating TEK into policymaking (Baker and Westman 2018; Eckert et al. 2020; Sidorova 2020). Baker and Westman (2018) investigate insufficiencies in Canada's regulatory assessment processes of natural resource development projects, finding that "the most impacted community members are not receiving information about major projects that is final or authoritative from their 'partners' in consultation" (Baker and Westman 2018, 850). Similar criticism was raised by a participant from the natural resource sector by alluding to the potential environmental and social impacts of a CNC—these

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[19] Traditional Indigenous Knowledge (IK) can be defined as "a network of knowledges, beliefs, and traditions intended to preserve, communicate, and contextualize Indigenous relationships with culture and landscape over time" (Bruchac 2014).

[20] Traditional Ecological Knowledge (TEK), in comparison with western science, "provides a broader area of nature observations and longer timelines of observations (Sidorova 2020). Knowledge held by Indigenous communities is often termed Traditional Knowledge (TK), while TK that is relevant for conservation science and wildlife management is often referred to as Traditional Ecological Knowledge (TEK) (Chapman and Schott 2020). TEK is increasingly included in environmentally based research, particularly research occurring on traditional territories associated with culturally important regions or species (Chapman and Schott 2020).

wide-ranging impacts would not be captured by the current assessment regulations in place.

Sidorova and Virla (2022, 41) find that for the CNC, meaningful incorporation of Indigenous local knowledge (ILK) through community-based environmental monitoring "and other strategies is key to succeed where other projects have fallen short because of tokenism, lack of meaningful engagement with communities, the power imbalance between western science and ILK and other factors." For the CNC or any other type of large-scale infrastructure to proceed, the results of roundtable discussions indicate that it is critical to recognize the geographic and population diversity of mid- and northern Canada and to consider local and Indigenous practices that can inform infrastructure development.

Environmental Concerns Prevail over the Impact of Infrastructure in Mid- and Northern Canada

> "[Corridor development] has to be respectful to balances, because our way of life was based on the land, and in the past, anytime there is development, it impacts the environment, the lands and waters, which we depend upon [...]. In terms of access to some of these traditional areas, some questions need to be answered; some solutions need to be made. This is not just an issue for me, but for the communities within our surrounding area."
>
> — Participant from an Indigenous government – West

Throughout the roundtable conversations, discussions centered around the potential environmental implications of a CNC. Canada's northern and Arctic regions are particularly vulnerable to climate change, as the region is warming "at a rate two to three times that of the global average" (MacDonald and Birchall 2020, 531). Cooley et al. (2020, 533) argue that "the Arctic is currently experiencing some of the fastest rates of environmental change on Earth, including reductions in sea ice extent, melting of glaciers and ice sheets, lengthening of the growing season, thawing of permafrost and intensification of the hydrologic cycle." Climate change also affects wildlife migration and habitats and, in turn, detrimentally affects communities and individuals with subsistence-based lifestyles. This exacerbates their dependence on resources shipped from the south, food and groceries, and other manufactured materials and equipment, including fossil fuels for heating and transport. Northern residents emphasized their dependency on the land for its natural resources; for example, traditional food supply secured by hunting and trapping activities and that development oftentimes causes environmental disruptions affecting wildlife migration routes, which are not always accounted for by public and private stakeholders (Vamosi 2023). Some participants expressed concern that most infrastructure development in Canada is tied to natural resource development projects and thus driven by key interests in the south of the country, but without consideration for the unique circumstances in Canada's northern regions:

> All too often, in the North, we experience people from the South with great ideas and huge projects with little understanding of some of the issues that exist on the ground here. [. . .]. There is a line there [in the CNC Research Program presentation] that said that this project [the CNC] has the potential to reduce environmental impacts, but I am not actually sure how that could be sold, because in our experience infrastructure corridors, roads, pipelines,

> hydro lines etc. are the single biggest cause of environmental impact. So the environmental impact of this project is going to be gigantic; it's a mega project, it's going to have mega impacts."
>
> — Participant from an environmental NGO

A participant from the natural resources sector highlighted that infrastructure and resource development involves negative environmental and social effects, for example, the loss of language, the loss of caribou and other wildlife, which are fundamental parts of traditional Indigenous livelihoods. The participant also cautioned that "there is a disconnection between communities," and that they might not benefit from corridor development. Participants argued that to ensure sustainable development, which caters to the needs of all Canadians, it is important for government and project proponents not only to consider economic benefits but also to recognize and mitigate environmental concerns.

Any Infrastructure Strategy Must Include Provisions for Soft Infrastructure to Address Existing Social Challenges in Mid- and Northern Canada

> I hope that infrastructure would help address the issue of a lack of adequate housing for off-reserve constituents; homelessness from an Indigenous paradigm is different than the western conception. When we look at projects like this [the CNC], we hope to see a two-eyed seeing approach that includes Indigenous viewpoints and western viewpoints — an approach that is cognizant of Indigenous needs and values and needs.
>
> — A participant from a social NGO

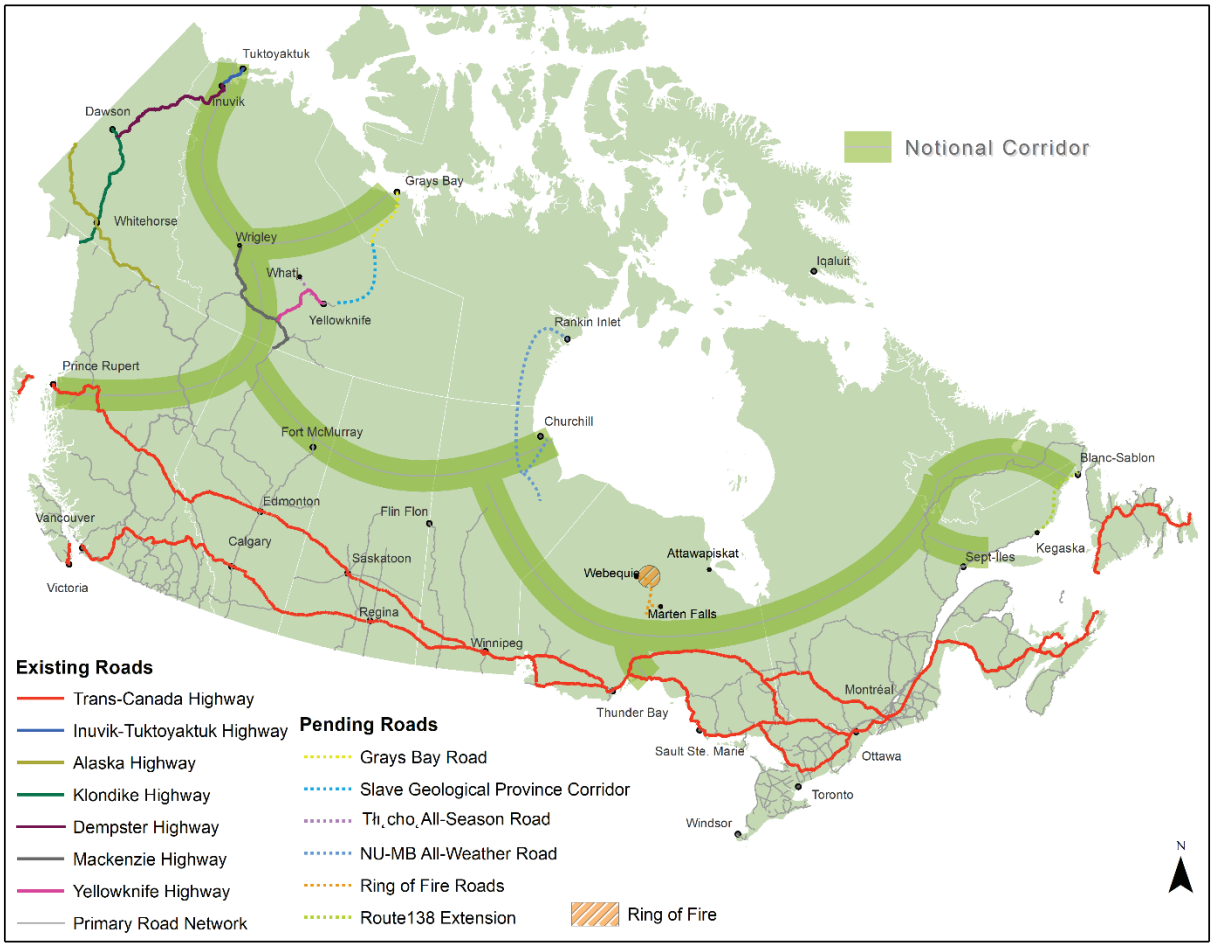
In terms of social concerns, the dominant concern among participants was that opening remote communities across mid- and northern Canada could create or exacerbate existing social issues within communities, such as increased access to illegal substances, which could subsequently increase crime. One participant representing a social NGO stated that the goal is to ensure that a potential CNC improves and does not exacerbate the existing issues related to crime and poverty within Indigenous communities. which "are always underpinned by the intergenerational impact of modern colonialism."

A participant from a municipal government in western Canada also mentioned that the COVID-19 pandemic worsened the healthcare crisis in remote communities and highlighted existing shortcomings, in particular the lack of mental health resources (e.g., addiction treatment). One of the conditions named by participants as one they must see before they could support corridor development, particularly from the perspective of social NGOs, was to consider not only physical (hard) infrastructure (such as roads and railways) but also to include provisions for social (soft) infrastructure that supports increasing local community capacities, healthcare access, education, adequate housing and local employment opportunities. Under these conditions, it was generally agreed during roundtable discussions that a CNC could have the potential to gain broader social acceptance.

DISCUSSION

The CNC concept is an idea for improving Canadian connectivity between north and south and between east and west by establishing new connections between existing and planned infrastructure corridors. Various corridors already exist in Canada and are currently in planning, which means that the CNC could serve as a unifying measure to address infrastructure gaps and bottlenecks that remain across mid- and northern Canada (Figure 4).

Figure 4: Primary Highway Corridors and Pending Highway Projects



Source: Map prepared by Munzur (2021) — republished with permission.

Figure 4 demonstrates that the main roadways are located in southern Canada, connecting urban centres. Importantly, all-season road connections exist between Whitehorse (YT) and Tuktoyaktuk (NWT), and between Yellowknife (NWT) and southern Alberta. However, it is striking that the northern parts of the provinces lack substantial road and rail connections, notably between Fort McMurray (AB), northern Saskatchewan and Churchill (MB) as well as in the northern parts of Ontario, Quebec and Labrador. As a result, communities across mid-Canada often rely on air transportation, similar to the residents in Yukon and Northwest Territories. Nunavut is particularly isolated, and is reliant on air transportation, as it has no connection to the national highway system.

While discussing the potential of infrastructure development in mid- and northern Canada, it is important to consider the strategies and policies currently in place to identify missing elements that create shortcomings and insufficiencies during their implementation process. For example, in 2016 the federal government launched the Investing in Canada Plan (IICP), which delivers investments in five focus areas (Table 3) over twelve years (Infrastructure Canada 2018). The plan signifies an important shift towards social and green infrastructure, shifting the policy focus on public transit for commuters and municipal infrastructure such as housing and early-learning childcare. The plan emphasizes that provinces, territories, municipalities and Indigenous communities are key partners, and offers investments in the areas of public transit, green infrastructure, social infrastructure, rural and northern communities and trade and transportation. The federal government also established the Canada Infrastructure Bank (CIB), which is an arms-length crown corporation, delivering investments in revenue-generating infrastructure projects by attracting both public and private capital for development that is in the interest of the public.

Table 3: Investing in Canada Plan, by funding stream

Social	Green	Public Transport	Trade and Transportation	Rural and Northern Communities
Investments in housing, early learning and childcare, accessible infrastructure and in community, culture and recreating infrastructure will create stronger, more vibrant communities.	The Plan will address persistent challenges to air, water and soil quality and make Canadian communities, including Indigenous communities, more resilient to climate change, natural disasters and extreme weather events.	By improving the capacity, quality, safety and accessibility of public transit infrastructure throughout Canada, the Plan will reduce urban congestion and increase the proportion of Canadians who use transit and active forms of transportation to access jobs, education, healthcare and social activities.	The Plan calls for investments that will build stronger, more efficient transportation corridors to international markets and help Canadian businesses compete, grow and create more jobs for Canada's middle class.	The investment will help rural and northern communities overcome the challenges that come with small, often widely dispersed populations and long distances from markets, which together make infrastructure projects expensive and difficult to manage.
$25.3 billion	**$26.9 billion**	**$28.7 billion**	**$ 10.1 billion**	**$2.0 billion**

Source: Infrastructure Canada (2018).

Although it is important to consider the context of the IICP, which was developed more than five years ago and before the COVID-19 pandemic, the limited support for rural and northern communities stands out. Given the logistical and climatic challenges across mid- and northern Canada, residents often do not benefit from investments in public transit or other infrastructure goals, such as electrification, which primarily apply to the existing infrastructure in urban centres. The majority of Canada's population resides in the south; however, communities across mid- and northern Canada require significant investments to address essential infrastructure priorities (such as reliable roadways and their maintenance), which places the allocated $2 billion in stark contrast to the other four focus areas, particularly the investment stream for public transit ($28.7 billion).

The strategic goals in the IICP largely overlap with the infrastructure needs identified during our research, including the need for capacity-building on the local government level, such as municipalities and Indigenous governments. The IICP targets municipalities through the municipal asset management program that supports municipalities in their decision-making processes about critical infrastructure investment (Federation of Canadian Municipalities 2023). The program supports good asset management practices by offering training and workshops, contributing to the planning and execution of data collection and analysis and gathering and sharing knowledge and lessons learned. However, during our roundtable conversations, none of the municipal representatives referred to the Federation of Canadian Municipalities as a potential support network that could facilitate infrastructure development by, for example, coordinating activities and establishing early connections and avenues for cooperation between governmental stakeholders.

The IICP is presented as a long-term infrastructure investment (Infrastructure Canada, 2018: 4). However, it covers just twelve years of infrastructure investment, a relatively short period in terms of long-term planning horizons and the life expectancy of many types of infrastructure. Funding uncertainty and a lack of strategic agenda-setting beyond federal election cycles may still derail investment planning and challenge the federal government to secure ongoing public and private support. This uncertainty and lack of policy continuity over the long term were indicated as major impediments to investment security by the industry stakeholders who participated in the roundtable discussions. Furthermore, the IICP claims to be a comprehensive plan with the alignment of strategic goals; however, the federal government needs to ensure that its support for individual projects aligns with the longer-term vision of a connected Canada and particularly fosters better connectivity between communities and their residents. Too often infrastructure projects are related to specific natural resource development goals (e.g., mining); however, this does not always cater to the needs of communities in their vicinity. Roads leading to nowhere should be avoided whenever possible in the future, as strategic goals should be comprehensive in that they address both, industry and community needs.

Current infrastructure strategies carry the risk of continuing the piecemeal approach that has contributed to Canada's infrastructure gap. An integrated infrastructure strategy for mid-and northern Canada, whether in the form of a corridor or a segmented approach, could help address the numerous gaps participants identified, such as a lack of digital connectivity and reliable transportation options. A key question from participants concerns the feasibility and funding of a corridor. Participants noted that it would be challenging to justify the related expenses without ensuring long-term benefits. A suggestion was made that it would be important to tie the principles of a CNC into existing key policy strategies such as Canada's ANPF, which also supports Canada's national security agenda (Crown-Indigenous Relations and Northern Affairs Canada 2019). Given the supply-chain challenges during the COVID-19 pandemic, participants supported a CNC that could increase Canada's resource autonomy, particularly in the electricity sector, to ensure a stable supply for Canadians.

However, participants also were adamant that any type of development be tied to several conditions. The most important two are the inclusion of Indigenous rights-holders from the beginning of any planning processes as well as a strong focus on sustainable infrastructure options that support both northern livelihoods and the environment and wildlife. Environmental NGO representatives noted that any sort of development,

for example, a road, can have cascading effects as it often triggers further development in the long term, with largely negative consequences for the environment. A large-scale endeavor such as a CNC carries the risk of negative impacts and outcomes for the boreal forest, wetlands and permafrost, and thus has to be carefully studied and assessed.

Nevertheless, most research participants did acknowledge that the current lack of connectivity has detrimental effects on northerners whose livelihoods are directly affected by a lack of access to healthcare, affordable food and groceries, and education and employment opportunities. The risks of carrying on with the status quo cannot be ignored; current neglect in northern and remote communities has led to various social crises, enhanced by the generational trauma of residential schools and the continuous impact of colonial legacies, leading to alcohol and drug abuse and increasing instances of domestic violence, suicide and human trafficking. Poor housing conditions, a lack of healthcare access and employment opportunities place northern and remote communities at a disadvantage in comparison to their southern counterparts.

Our study and the results show that a CNC — in any type or form — entails more than linear or point-to-point infrastructure development. Infrastructure is closely interwoven with living conditions and the resources available to residents. Many roundtable discussions evolved around broader social issues faced by communities, such as healthcare access. We find that the CNC as originally envisioned must be conceptually extended to address these local conditions experienced within mid- and northern Canadian communities. We propose to reframe the CNC as a connective infrastructure corridor approach that includes both linear and point-to-point (such as marine ports and airports) hard infrastructure, and perhaps more importantly, community and soft infrastructure (such as education and healthcare).

Potential CNC impact assessments will have to carefully consider the economic, environmental, social and political consequences. Our roundtable discussions coincided with several global events, such as the continued restrictions due to the COVID-19 pandemic and Russia's invasion of Ukraine. It is not a surprise that, for example, digital infrastructure was a main priority for a majority of participants who may have faced digital connectivity issues during pandemic restrictions. Furthermore, Russian actions posed new questions about Canada's role in the Arctic, both in terms of security and sovereignty. As such, Canada's geopolitical position was also discussed in many roundtables, and participants expressed the need for a long-term infrastructure vision in the Canadian North and Arctic to support its security agenda and to reinforce its sovereignty over Arctic territory. Infrastructure development, for example surveillance and radar technologies, were seen as instruments to effectively monitor Canada's northern and Arctic territory with a co-benefit of detecting environmental disasters in the early stages.

While municipal and provincial/territorial stakeholders emphasized the supporting role of the federal government, municipal and Indigenous governments in particular raised concerns about a potential top-down approach that neglects the perspectives of communities across mid- and northern Canada. Instead, a significant portion of participants prefers increased engagement among all rights- and stakeholders. The governance framework of a potential CNC was a key point of debate during roundtable discussions. Specifically, northern Indigenous residents have been subjected to regulatory frameworks that perpetuate Canada's colonial legacies, with the result that their voices have not gained

the same recognition and traction as those originating from non-Indigenous residents in the southern urban centres of the country. Indeed, in 2019 the Government of Canada acknowledged that "for too long, Canada's Arctic and northern residents, especially Indigenous Peoples, have not had access to the same services, opportunities, standards of living as those enjoyed by other Canadians" (Crown-Indigenous Relations and Northern Affairs Canada 2019:2). A CNC governance framework that incorporates the perspectives of northern and Indigenous residents could overcome the residual settler colonial practices around both infrastructure development and natural resource management in Canada.

The CNC was generally considered a potential solution to mitigate the infrastructure gap between north and south and between rural and urban areas. Participants found merit in the economic potential of a CNC, including the social benefits that would be paired with better employment opportunities, digital access to healthcare and education, and potential improvements in housing conditions and food security. Generally, the CNC was considered a tool to enhance Canada's trade diversification. At the same time, participants also raised concerns about the potential environmental impacts of infrastructure development and the social risks for residents of remote communities if they were to open up due to infrastructure development.

POLICY RECOMMENDATIONS

The following ten policy recommendations are a reflection of the concrete infrastructure and policy-related concerns that roundtable participants shared with us. The research team is not in a position to make concrete physical infrastructure suggestions or to discriminate against a specific route or mode of infrastructure. However, we are emphasizing the stated need to keep a special focus on digital infrastructure, as insufficient broadband was shared as a main concern across roundtables. Instead, the policy recommendations focus on the potential CNC governance framework and the elements that were identified as essential by roundtable participants, such as a focus on Indigenous participation and social matters related to healthcare and education access. Furthermore, while it is still unclear if a CNC will ever be realized, the recommendations reflect the potential utility of the CNC concept for Canada as a tool to provide a nationwide long-term and integrated infrastructure strategy, or at least a vision for Canada to safeguard its competitiveness for future generations amidst climate change and its consequences.

RECOMMENDATION 1

Canada needs a long-term strategic and integrated infrastructure vision for mid- and northern Canada that focuses on long-term policy priorities of communities.

For too long, infrastructure projects have been delivered in a piecemeal approach to the detriment of predominantly Indigenous communities, which had to navigate the cascading effects of past resource development practices and their adverse effects on the environment without reaping some of the benefits of enhanced economic development. Throughout the roundtables, it became clear that Canada is currently lacking a long-term, integrated and strategic infrastructure vision that withstands Canada's four-year election cycle, despite existing policy framework documents such as the Investing in Canada Plan

(Infrastructure Canada 2018). At the same time, communities across Canada's vast northern geography face different socio-economic, environmental and logistical challenges related to infrastructure development, such as the presence of permafrost, which affects both northern livelihoods and project proponents. For example, permafrost thaw can damage existing infrastructure such as roads, railways and housing, and requires complex solutions from developers.

Thus, we recommend the federal government spearhead a region-based infrastructure assessment in mid- and northern Canada to integrate the views and perspectives of different rights- and stakeholders, including Indigenous, municipal, territorial and provincial governments, avoiding a top-down approach and at the same recognizing the importance of federal support and coordination. This would result in a regionalized national strategy that takes into account place-based knowledge and context to adequately capture and respond to regional circumstances. An example of such collaboration is the development of the ANPF, which was led by the federal government and, for the first time, was co-developed with Indigenous, territorial and provincial partners who had the opportunity to contribute and actively shape the strategy (Crown-Indigenous Relations and Northern Affairs Canada 2019). Regional energy and resource tables are another example of multi-level governmental cooperation. These regional tables were established by the federal government to create joint partnerships with each province and territory, and to foster collaboration with Indigenous partners (Natural Resources Canada 2023). The goal is to empower provinces and territories to decide on their economic priorities and collaborate with the federal government to achieve them as part of a net-zero economy. This type of partnership, informed by a regional approach, could support the development of a long-term strategic and integrated mid- and northern Canadian infrastructure approach.

RECOMMENDATION 2

Infrastructure policy development for mid- and northern Canada must focus on collaborative approaches that foster cooperation and coordination rather than competition between communities.

Rights- and stakeholders who participated in our roundtables identified a lack of collaboration and cooperation between all governmental levels as a key obstacle to effective decision-making processes. One of the identified reasons is that cross-border cooperation and knowledge exchange lacks priority as communities struggle with their challenges, which forces them to look towards their own needs first while sacrificing the benefits that would derive from increased cooperation. However, despite their geographic and socio-economic diversity, many common needs and concerns were identified across roundtables, such as a lack of reliable broadband and energy supply. Participants appreciated that these issues could be more efficiently tackled through collaborative approaches that include all relevant rights- and stakeholders. Instead, the status quo is competition between communities for the same funding envelopes. Pooling capacities and resources could be a more efficient way to address Canada's infrastructure gap. For example, municipalities across mid- and northern Canada often already have developed sophisticated infrastructure strategies. However, participants expressed that despite various mechanisms in place (such as the Council of the Federation or the Federation of Canadian Municipalities), there is still a lack of coordination across provincial and territorial borders and sometimes even between communities within the same province/territory. At the minimum, communities should

have the opportunities, for example through adequate forums or platforms, to gain a better understanding of available resources and strategies to address shared challenges. This would require the preparation of joint databases and joint events in which community rights- and stakeholders have the opportunity to exchange knowledge and information.

RECOMMENDATION 3

Streamlining of regulatory frameworks is required to improve efficiency, integration and coordination in the planning and approval of hard and soft infrastructure development.

Many policies and regulations typically constrain and determine the conditions for infrastructure development. Their purpose is generally to ensure viability, safety and sustainability, and to maximize benefits and minimize any negative social and environmental impacts. However, in the case of linear infrastructure, these often involve multiple overlapping jurisdictions and mandates, resulting in stalemates, procedural delays, uncertainty, high costs and excessive amounts of time for decisions. This has contributed to substantial declines in Canada's reputation in terms of the attractiveness of investments to address its growing infrastructure deficits, especially across mid- and northern regions. A common theme in the roundtables was the need for regulatory streamlining to improve efficiency, integration and coordination between rights- and stakeholders. This streamlining should include approaches such as coordinated strategic regional infrastructure assessments at the planning and regulatory stages to provide for earlier and more fulsome evaluation of benefits, costs and concerns, address jurisdictional overlaps and conflicts, and avoid duplication of resources for environmental impact and other impact evaluation.

RECOMMENDATION 4

A corridor approach for Canada must include more than linear infrastructure. Decision-makers are encouraged to adopt a connective infrastructure approach that includes digital as well as soft infrastructure related to social aspects, such as education and healthcare.

Throughout our research, the concept of a northern corridor was challenged from various perspectives, such as its financial, regulatory, logistical and practical feasibility. While roundtable participants recognized the need for improved connectivity across Canada, which at times included linear infrastructure such as roads and railways, many alternatives to a corridor were presented, as it was perceived as a too narrow and limiting approach. A strong focus was placed on digital infrastructure as one of the key priorities across all roundtables. Another focus included northern and Indigenous capacity-building to facilitate collaboration between all rights- and stakeholders, which requires soft infrastructure such as adequate training and education opportunities as well as healthcare, including mental health and addictions services. Pivoting the focus of the corridor in the direction of connective infrastructure across mid- and northern Canada, and ultimately building connections between east and west, north and south, shifts the focus towards soft infrastructure. Local and regional issues such as housing, healthcare and education require adequate solutions to capture regional circumstances across mid- and northern Canada. A connective infrastructure approach, focusing on both transportation and soft infrastructure, still maintains the emphasis that Canada needs a long-term, strategic and integrated infrastructure vision for mid- and northern Canada.

RECOMMENDATION 5

Resources are necessary to target local capacity-building across communities in mid- and northern Canada.

Across roundtables, participants expressed that any type of infrastructure proposal should ideally originate within communities and build on local expertise. However, some communities in mid- and northern Canada face capacity constraints as they struggle to offer training opportunities for their residents and to attract skilled labor due to the lack of adequate infrastructure. Oftentimes, municipal and Indigenous government representatives "wear many hats," meaning that individuals are stretched thin across several tasks and function within several capacities in their communities. These engaged individuals need support. Indigenous and remote northern communities receive a certain amount of financial support from federal and provincial/territorial governments. However, communities would also benefit from resources that support and facilitate local capacity-building, which would eventually support local empowerment and self-sufficiency. Support from institutions such as the Federation of Canadian Municipalities is crucial to foster partnerships between communities and strengthen local initiatives.

RECOMMENDATION 6

While federal support is important, any national infrastructure vision for mid- and northern Canada must incorporate the priorities of local Indigenous and municipal rights- and stakeholders about, for example, environmental concerns related to corridor development. This approach avoids a top-down infrastructure approach and recognizes the role of these communities in addressing the challenges related to climate change and supply-chain constraints that we are facing today.

Communities across mid- and northern Canada are important for Canada's export-oriented economy. However, roundtable participants from smaller and more remote communities expressed that their priorities were often overlooked in previous infrastructure strategies and projects, leading to unintended consequences that can have significant impacts on northern livelihoods, the ecosystem and wildlife. While recognizing the spearheading role of the federal government in the development of a national infrastructure framework that encompasses mid- and northern Canada, municipal and Indigenous governments also raised the condition that any such framework needs to incorporate their local and regional priorities and knowledge to avoid top-down governance and implementation that affect them adversely. Communities in Canada are key to addressing pressing concerns related to climate change and global geopolitical crises that constrain supply chains and directly affect affordability and living standards across Canada, including metropolitan areas. Northern and remote communities must be part of Canada's economic growth strategy, which must be steered toward trade diversification to increase resilience during geopolitical uncertainty and climate change.

RECOMMENDATION 7

A majority of communities in mid- and northern Canada consist of Indigenous populations, including First Nations, Métis and Inuit. A connective infrastructure approach supports reconciliation on the condition that it supports Indigenous self-governance, participation and inclusion and facilitates Indigenous-owned initiatives.

The current infrastructure approach places Indigenous Peoples at a disadvantage, with less access to services and opportunities. Throughout the research, roundtable participants emphasized the need for Indigenous capacity-building and shared the opinion that any proposed infrastructure development ideally must originate from the communities themselves. Too often Indigenous Peoples are sidelined during development projects, creating negative outcomes for their communities and livelihoods by adversely impacting the environment or not sufficiently mitigating negative effects. Instead, Indigenous communities deserve support in building their capacities to develop initiatives that improve their living conditions. The current resource-driven approach is not sufficient and perpetuates the colonial legacies of Canadian policies, which disregard Indigenous concerns. A new integrated and strategic, long-term infrastructure approach for mid- and northern Canada can support Canada's path to reconciliation with Indigenous Peoples.

RECOMMENDATION 8

While infrastructure needs vary across mid- and northern Canada, governments and the private sector should collaborate to allocate resources targeting the rural/urban and northern/southern digital divide in Canada.

Canada's infrastructure gap was already highlighted in the Investing in Canada Plan, which currently forms the basis for major infrastructure projects in the country (Infrastructure Canada 2018). However, many infrastructure needs in mid- and northern Canada remain unaddressed, ranging from safe roadways to digital infrastructure to adequate housing and access to clean drinking water. While needs are many, roundtable participants expressed that digital infrastructure must be one of the priorities, especially since the COVID-19 pandemic has both revealed and exacerbated digital insufficiencies across Canada. Technologies such as low Earth orbit satellites, are emerging but accessibility and affordability remain a problem across provinces and territories, leading to patchy network coverage. Besides being unable to participate in the modern market economy, to access online healthcare and education platforms, a lack of broadband and mobile coverage can also create safety issues for residents travelling extensive distances in mid- and northern Canada. An early focus of infrastructure development should be placed on digitizing highways and roadways to ensure mobile coverage and access to emergency responders.

RECOMMENDATION 9

Recent challenges experienced with global and Canadian supply chains underline the need for strategic and targeted infrastructure optionality to ensure reliable transportation and access to goods and services.

Climate change and geopolitical instability challenge Canada's market economy, which relies on stable supply chains across east and west. The flooding event in BC at the end of 2021 was just one example in which both roadways and railways were severely damaged between Alberta and BC, challenging transportation logistics and leading to shortages of essential supplies. Climate scientists predict that such events will increase in both frequency and severity, posing significant risks to the security of Canada's existing transportation routes. Carefully targeted redundancy, for example for transportation, energy and digital infrastructure, is necessary to mitigate negative outcomes for communities when critical infrastructure is affected by devastating natural disasters and to ensure the transport of essential supplies. Instances where only one bridge leads into a community and beyond can be extremely critical if washouts or mudslides occur, and having alternative transportation options is critical for the survival of communities across mid- and northern Canada. Furthermore, the floods in BC impacted southern urban centres, including Vancouver, and thus highlight that environmental disasters are not only a threat to remote communities. Having transportation options as well as transmission lines across mid-and northern Canada can offer greater reliability that is needed for all urban and rural communities.

RECOMMENDATION 10

Infrastructure development, focused on transportation and access to services such as healthcare, is essential to safeguard for future generations the high living standards Canadians enjoy today. For all Canadians to benefit, infrastructure development must adhere to the principles of equity, diversity, inclusion and accessibility.

Canada's connective infrastructure, such as the TransCanada Highway, was not developed with the near future or election cycles in mind. Throughout the roundtable discussions, we heard that Canada needs a long-term infrastructure vision that considers the well-being of future generations. It is a certainty that climate change will progress, with potentially devastating consequences for critical infrastructure, and Canadian governments have a moral imperative to prepare for the worst, to avoid loss of life and property. Businesses have the duty to develop infrastructure responsibly and sustainably, without exacerbating cumulative environmental harms, and to use innovations and technologies to improve living conditions across Canada. We suggest integrating the principles of equity, diversity, inclusion and accessibility into future infrastructure strategies to ensure the inclusion of voices from vulnerable members of Canada's society and to incorporate diverse perspectives and ideas (Parole Board of Canada 2022). The goal is to achieve equity across Canada by offering access to the resources that are necessary to achieve similar social and economic outcomes across all of Canada with the ultimate goal of reducing its persistent infrastructure deficit.

CONCLUSION

This paper contributes to the CNC Research Program that aims to investigate the feasibility, desirability and acceptability of the corridor concept to advance integrated and long-term infrastructure planning and development in Canada. Post-pandemic recovery, climate change mitigation and the geopolitical instability in Europe are just some of the challenges Canada is facing nowadays, and they directly impact supply chains and global markets. An infrastructure corridor, internationally recognized as a suitable solution to address transportation constraints, could potentially support Canada in enhancing and maintaining its market competitiveness while ensuring adequate living standards for all Canadians.

This paper has presented the key findings of the Stakeholder Engagement Program by answering three questions: 1) What key gaps in infrastructure and infrastructure policy persist according to potential rights- and stakeholders? 2) What are the potential impacts, challenges and opportunities of the CNC according to those rights- and stakeholders? 3) Which factors and conditions would make corridor development acceptable, or unacceptable for a given rights- or stakeholder? Roundtable discussions were structured around four core themes: infrastructure needs and priorities across mid- and northern Canada; challenges, barriers and lessons learned from previous infrastructure development initiatives; expected benefits and governance considerations related to a CNC; and trade-offs and conditions for CNC development.

While discussing infrastructure needs and priorities, roundtable participants identified several priority areas related to digital connectivity; safe, reliable and resilient transportation infrastructure such as roadways; and equitable access to essentials such as housing, education and healthcare, energy and food security. In addition, stakeholders also referred to several policy-related factors exacerbating the infrastructure gap between north and south. Meaningful engagement and participation of Indigenous and local communities was highlighted as a crucial condition for any type of development but has been insufficiently incorporated in previous infrastructure strategies. Furthermore, overly complex and overlapping regulatory frameworks have impeded private investment, particularly from foreign investors. While regulatory frameworks were considered essential to safeguard the rights of stakeholders, including Indigenous land title, and to uphold stringent protocols to protect the environment, roundtable participants did ask for a review of regulations to streamline procedures, and to facilitate cooperation between rights- and stakeholders and across jurisdictional boundaries, where suitable.

Several consequences of a CNC were considered, and the most important one was the environmental impact of any type of development on ecosystems and wildlife. Particularly northern Canada is a region exposed to the consequences of climate change due to an increased frequency of wildfire and accelerating permafrost thaw. A CNC was largely considered problematic from an environmental perspective, with only limited capabilities to mitigate the negative impacts of roads and other types of linear infrastructure that affect wildlife migration routes. At the same time, roundtable participants recognized Canada is in a vulnerable global position. As a trade-focused economy, the risk of supply-chain collapse affects the well-being of all Canadians, and thus, the CNC was considered a potential solution to enhance Canada's resiliency to environmental and geopolitical challenges.

Roundtable participants identified specific trade-offs and conditions considered essential for the success of any type of infrastructure development. One condition mentioned for corridor development is the integration of local (northern) expertise into policy framework and implementation discussions. Participants oftentimes described experiences in which southern-based solutions sometimes fail in northern environmental, geographic and socio-demographic circumstances. In addition to environmental concerns, participants frequently noted the social circumstances in smaller communities and how they may benefit from a corridor, alongside potential negative impacts of increased connectivity, such as an increased flow of illegal substances. However, infrastructure such as housing, healthcare and education were considered priorities in mid- and northern Canadian communities and participants want to see soft infrastructure included in a CNC framework.

We find that a large-scale corridor concept is challenging to conceive, in both theory and practice, for mid- and northern Canada. We recommend a segmented corridor approach by focusing on those development initiatives that are already gaining public acceptance, and that communities identify as key priorities, such as digital infrastructure. One early priority could be the digitization of highways and roadways to enhance safety while travelling, and to digitally connect communities. As such, a corridor approach must reflect a holistic strategy addressing the existing shortcomings related to the infrastructure gap in mid- and northern Canada which contributes to problems around unreliable transportation pathways, digital connectivity, food insecurity, inadequate housing and lack of healthcare and education.

As the research team, we are aware that our roundtable discussions, held throughout spring and summer 2022, provide a snapshot in time based on the individual perspectives of governmental, industry and NGO representatives. For a CNC framework to progress, further targeted engagement and conversations are necessary. Particularly perspectives from Indigenous rights-holders, which have been often marginalized in conversations such as these, need to be expanded. Engagement as a research method relies on building rapport, and one-off discussions are not sufficient to build trust between government, industry, researchers and other rights- and stakeholders. We suggest repeated discussions about the CNC concept to gain insight into northern local circumstances, and to learn not only about their key concerns, but also to emphasize the solutions that have already been established. For example, to improve food security, several participants raised the role of food autonomy through the maintenance of community gardens and greenhouses. Local solutions such as these must be considered in future research to identify the gaps and shortcomings that a CNC could address.

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