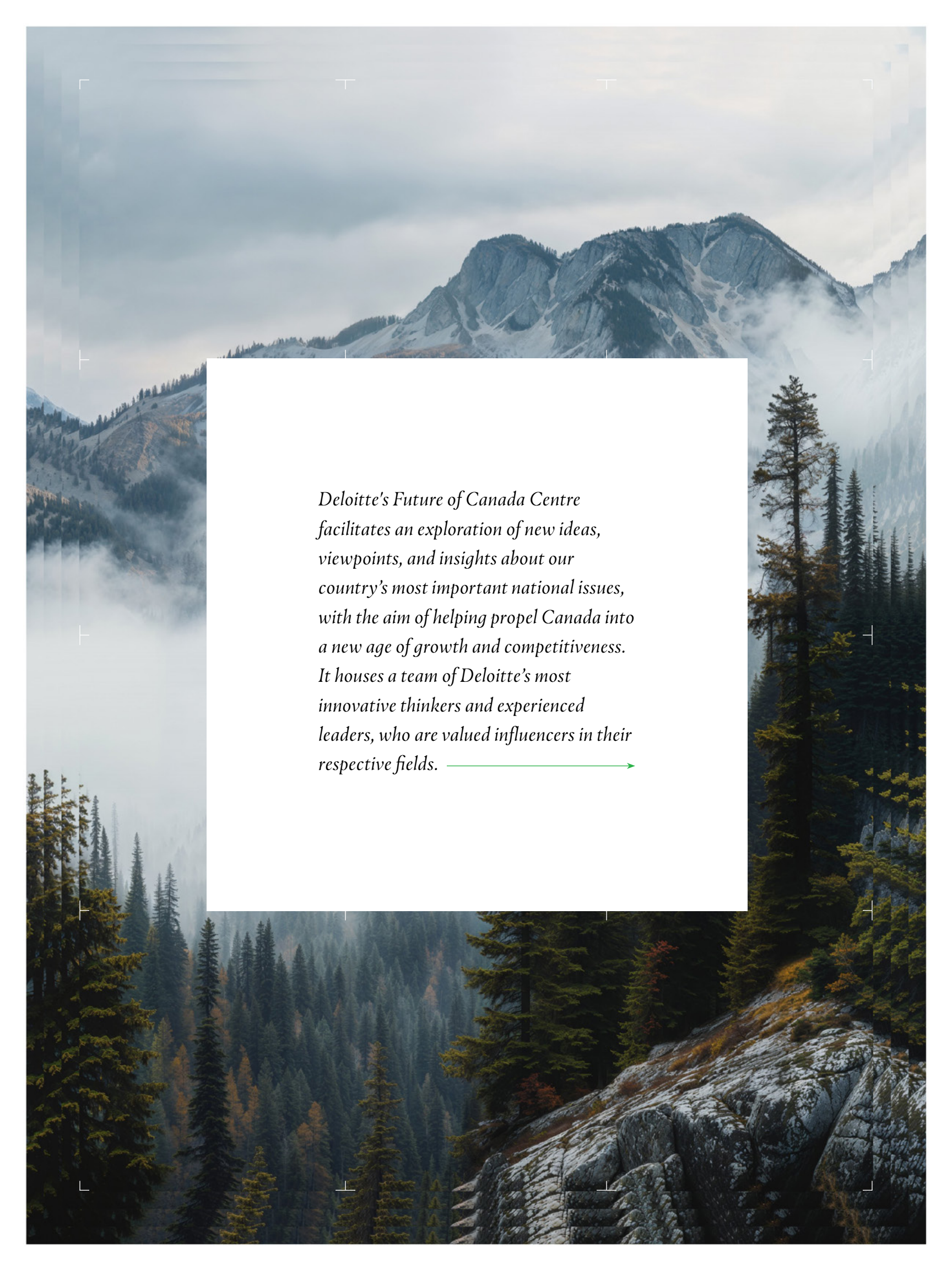


CATALYST

FUTURE OF CANADA CENTRE

Global disruption in 4D: Exploring intersecting forces impacting Canada's future





Deloitte's Future of Canada Centre facilitates an exploration of new ideas, viewpoints, and insights about our country's most important national issues, with the aim of helping propel Canada into a new age of growth and competitiveness. It houses a team of Deloitte's most innovative thinkers and experienced leaders, who are valued influencers in their respective fields. —————→

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INTRODUCTION

COMPLEX ISSUES NEED SOPHISTICATED RESPONSES

→ *Uncertainty about the future of the world has deepened in recent years.*

Numerous events with global ramifications—from pandemics and destructive weather events to lengthy, violent conflicts and technological revolutions—have left leaders with more questions than answers. While Canada possesses enduring advantages, it will have to confront and adapt to this environment of volatility to ensure a secure and prosperous future for all of us who call it home.

We see four, interconnected disruptions at the global level that are having a significant impact on life in Canada: the **talent transformation**, the **artificial intelligence (AI) revolution**, the **race to net-zero**, and **geopolitical uncertainty**. These forces are deeply intertwined, with each influencing the others. For instance, capitalizing on the immense opportunity of AI requires first equipping workers with the skills to use it effectively. Similarly, making progress on net-zero emissions goals means also being aware of the potential for geopolitical conflict to rupture the supply chains that bring in the goods critical to the energy transition.

To build a better future, Canada must address these disruptions not only individually but also by recognizing the trade-offs and interdependencies between them. This calls for systems-level thinking, greater collaboration, and a willingness to think innovatively. At Deloitte, we believe we have both a **calling and a duty** to drive positive change for Canada. While this report is not a prediction nor a deep dive, we do aspire for it to shift the perspectives of our country's leaders, prompting them to examine these disruptions separately and in relation to each other as they **map out a thriving future together**.

THE FOUR DISRUPTIONS

TALENT TRANSFORMATION

Since 2020, the world of work has changed dramatically. Employers are now confronted with growing **shortages of both workers and skills**, caused by an aging population, rapidly changing skills needs, and evolving worker preferences.

AI REVOLUTION

In recent years, the **explosion of advancements in AI**—particularly Generative AI—has disrupted activities from coding to creative work to health care. These innovations are revolutionizing how **humans interact with technology**.



THE RACE TO NET-ZERO

We have reached an **inflection point**: we're running out of time to take tangible action to slow climate change. This growing recognition is prompting accelerated efforts worldwide to **achieve a net-zero future**.


GEOPOLITICAL UNCERTAINTY

Global power dynamics are in flux, leading to an **escalation in geopolitical uncertainty**. As countries seek to gain a footing or secure advantages in this environment, we're seeing far-reaching repercussions on **supply chains, trade, and security**.

OUR RESEARCH APPROACH

To inform this report, Deloitte's Future of Canada Centre conducted a **survey of 828 managers and executives** across Canada from June 16 to 30, 2023. Respondents included representatives from organizations of varying sizes and economic sectors, as well as governments and other public sector entities. The survey data has been weighted to Statistics Canada population data for enterprises by size and region, and has a margin of error of plus or minus 3.46% at a 95% confidence interval.

We also conducted a series of **eight roundtables** and **one flagship symposium** with CEOs and directors from across the country. These discussions aimed to gather insights about the four global disruptions and their impacts on Canada. The gatherings took place in Vancouver, Calgary, Regina, Winnipeg, Toronto, Ottawa, Montreal, Saint John, and Halifax, and are reflected in the section *Insights from Canada's business leaders.*

Lastly, in the fall of 2023, we conducted **two workshops** with external specialists to explore specific global disruptions. One workshop focused on **AI revolution** and how it intersects with the other areas, and the other on **the race to net-zero** emissions and its intersections. These workshops helped us gain in-depth insights and determine which intersections were important for Canadian leaders to prioritize. 

PART ONE

GLOBAL DISRUPTIONS IMPACTING CANADA



→ Through our research, we've determined that **these global disruptions**—and how we respond to them—will fundamentally reshape the future of Canada.

A large majority (80%) of our survey respondents agreed that **Canada's current and future prosperity hinges on effectively addressing them**. This will involve operating in an international environment that has, according to 79% of our respondents, shifted dramatically in just a few short years.

The following pages provide an overview of the four disruptions, along with **evidence of their real-life consequences** from our survey findings.

What is a disruption?

For this report, we define a **disruption** as a recent phenomenon that has a significant impact on Canada.

1. It is **global** in nature.
2. It has **emerged, substantially changed, or intensified** since 2020.
3. It has **significant, far-reaching, and pressing** implications for Canada:

- It is **significant** enough to considerably affect national economic and societal well-being.
- It is **far-reaching** enough to be felt across multiple sectors and regions.
- It is **pressing** enough to require urgent response by business leaders and policymakers.

This report does not address disturbances that are cyclical, constant, or recurring in nature; that are experienced only by a handful of countries; that primarily impact only one sector or region; or that have uncertain repercussions that may not materialize in the short term.

Disruption 1

TALENT TRANSFORMATION



→ **Phenomenon** — Since 2020, the world of work has transformed dramatically. Employers today are confronted with growing shortages of both workers and skills, caused by an aging population, rapidly changing needs in skills, and evolving worker preferences.

→ **Drivers** — Canada's labour force growth rate has been trending downward since 2000, but the decline has gathered speed in recent years as baby boomers—those born between 1945 and 1964, members of one of Canada's largest generations—began to retire. At the same time, as technology advances and industries evolve, employers' needs are shifting: the demand for technical skills is growing, digital literacy is becoming a prerequisite for most jobs, and human skills such as communication, collaboration, creativity, and problem-solving are more important than ever. Furthermore, since the pandemic, workers have become more interested in flexibility and purposeful work.¹

→ **Impact** — If this disruption in the workforce isn't addressed soon, widespread and prolonged job vacancies and skills shortages will continue to negatively impact business innovation, growth, and

productivity.² This is hurting Canada's overall competitiveness and growth potential. But if we invest in reskilling the workforce, we can bridge skills gaps and enhance one of our country's signature competitive advantages: a world-class, highly educated labour force, one that consistently places Canada at the **top of G7 countries** for share of working-age people with a college or university credential (57.5%).⁵

At the international level, reskilled workforces could contribute up to **US\$6.5 trillion to the global GDP** and create an estimated 5.3 million new jobs by 2030.⁴ For Canada, navigating the evolving workforce is an opportunity to address its persistently lagging labour productivity, which stood at just 18th among Organisation for Economic Co-operation and Development (OECD) countries in 2023.⁵

Survey findings

74%

say it's a challenge to hire employees who have the skills the organization needs.

62%

face a persistent shortage of skills among existing employees. At the same time, only 31% say they're "highly effective" at providing professional development opportunities to close this gap.

64%

view competitive wages and benefits as "highly important" for attracting and retaining talent, but only 36% say they are "highly effective" at offering this.

Construction and real estate leaders consider growing shortages to be the greatest threat to their organizational health.



AI REVOLUTION



→ **Phenomenon** — In recent years, the explosion of advancements in AI—particularly Generative AI (GenAI)—has disrupted activities from coding to creative work to health care. These innovations are revolutionizing how humans interact with technology.

→ **Drivers** — The modern concept of AI has been around for several decades, but recent breakthroughs—including the exponential growth in computing power, the proliferation of data, and advancements in machine learning techniques—have made AI technologies more accurate, reliable, and capable of handling complex tasks. A crucial factor in the acceleration of AI-driven disruption is the democratization of the technologies. The development of user-friendly tools, frameworks, and platforms has made AI more accessible to individuals, startups, and small businesses, empowering a wider range of users to capitalize on its capabilities.

→ **Impact** — Our research suggests that Canadian organizations are lagging in AI adoption due in large part to the difficulties they face in hiring the talent they need to deploy and leverage AI. They

also struggle to commercialize AI, which poses particular challenges for startups and scale-ups, many of which find it difficult to grow and remain in Canada. Failing to address these challenges could result in missed opportunities for AI-enabled economic growth and productivity gains. And these opportunities are significant: by one estimate, harnessing GenAI alone could result in a remarkable **7% increase in global GDP**—that’s nearly US\$7 trillion—as well as a **1.5-percentage-point increase in productivity growth** over a 10-year period.⁶

Survey findings

90%

say that adapting to technological change is a moderate to high priority, yet more than half (56%) don't use AI and aren't in the process of adopting it.

15%

are currently using AI, while 19% plan to adopt it in the next few years.

48%

feel their employees are barely or not at all prepared to use AI or GenAI. Only 5% say their workers are "very prepared."



THE RACE TO NET-ZERO



→ **Phenomenon** — We have reached an inflection point: we're running out of time to take tangible action to slow climate change. This growing recognition is prompting accelerated efforts worldwide to achieve a net-zero future.

→ **Drivers** — The impacts of climate change—extreme weather events, rising sea levels, and biodiversity loss chief among them—have become more apparent and alarming in recent years, leading to a greater sense of urgency among governments, businesses, and the public to reduce greenhouse gas (GHG) emissions. A clearer understanding of the economic and social benefits of transitioning to a low-carbon economy is also spurring interest in action. For example, in a context where fossil fuels continue to play a significant role in the global energy mix, decarbonization is becoming integral. Meanwhile, renewable energy technologies have become more affordable and efficient, making them increasingly viable as an energy source. This, coupled with the recognition that investments in clean energy can stimulate economic growth, create jobs, and enhance energy security, has motivated governments and businesses to act.

→ **Impact** — The consequences of global inaction could be severe. Failing to take coordinated international climate action will almost certainly exacerbate the challenges—including energy insecurity

and supply chain disruptions—and could lead to greater damage from natural disasters, scarcer resources, and social unrest. By one estimate, **Canada's GDP will be \$35 billion lower** because of climate change than it otherwise would have been.⁷ By the end of the century, climate change could cost our country upward of \$5.5 trillion due to biodiversity loss, higher sea levels, and damages from wildfires and floods.⁸

Conversely, taking decisive and coordinated climate action holds the potential for significant benefits for people everywhere, to not only achieve net-zero goals—thereby helping ensure the planet's health—but also to **boost the global economy by US\$43 trillion by 2070.**⁹

Survey findings

64%

have no target for reaching net-zero emissions. Meanwhile, 33% say energy transition is not a concern for them, and 22% are concerned but not at all prepared.

33%

of organizations in Alberta and 38% in the Prairies agree that Canada needs to shift to a low-carbon economy. By contrast, 54% of Ontario and 62% of Quebec organizations agree.

52%

say reducing their carbon footprint is far down their priority list.

48%

have not allocated any of their operating budgets to renewable energy or climate action. In Alberta, this figure rises to 56%; in Quebec, it falls to 39%.



A STUDY IN CONTRASTS

In Quebec, 23% consider reducing their carbon footprint to be a high priority, compared to just 6% in Alberta.

In Quebec, 76% consider reducing their carbon footprint a priority to some extent, compared to 59% in Alberta.



Disruption 4

GEOPOLITICAL UNCERTAINTY



→ **Phenomenon** — Global power dynamics are in flux, leading to an escalation in geopolitical uncertainty. As countries seek to gain a footing or secure advantages in this environment, we're seeing far-reaching repercussions on supply chains, trade, and security.

→ **Drivers** — For decades, the world order was shaped by globalization and the rule of law. In recent years, however, a series of conflicts, coupled with ongoing trade tensions, has ushered in a new era of geopolitical risk and uncertainty. Since Russia's invasion of Ukraine, NATO-Russia relations have deteriorated; they're the most unstable they've been since the Cold War. Increasingly complex US-China relations are significantly impacting global trade. And the growth of nationalism, protectionism, and populist movements, particularly since the pandemic, has cast a veil of ambiguity over the future of international cooperation and the flow of global trade.

→ **Impact** — According to the February 2024 Fortune/Deloitte CEO Survey, the majority of chief executives (65%) have identified geopolitical instability as the **top most influential external issue** expected

to disrupt business strategies within the next year.¹⁰ Canada, a trading nation committed to multilateralism, faces both risks and opportunities in this context. Our heavy reliance on trade means strains on and interruptions to global supply chains are keenly felt, especially by distributors, manufacturers, and construction companies. It makes us vulnerable to the growing shift toward protectionism, such as certain measures taken by the United States in recent years, and increasing tensions and trade restrictions with countries like China and India, which could be detrimental to Canadian exports and trade relationships.

However, if we can carefully navigate this uncertainty, there are also options. Identifying strategic parts of changing global supply chains where Canada could increase exports, for example, would help our allies diversify and build resilience while bolstering our own economic competitiveness.

Survey findings

64%

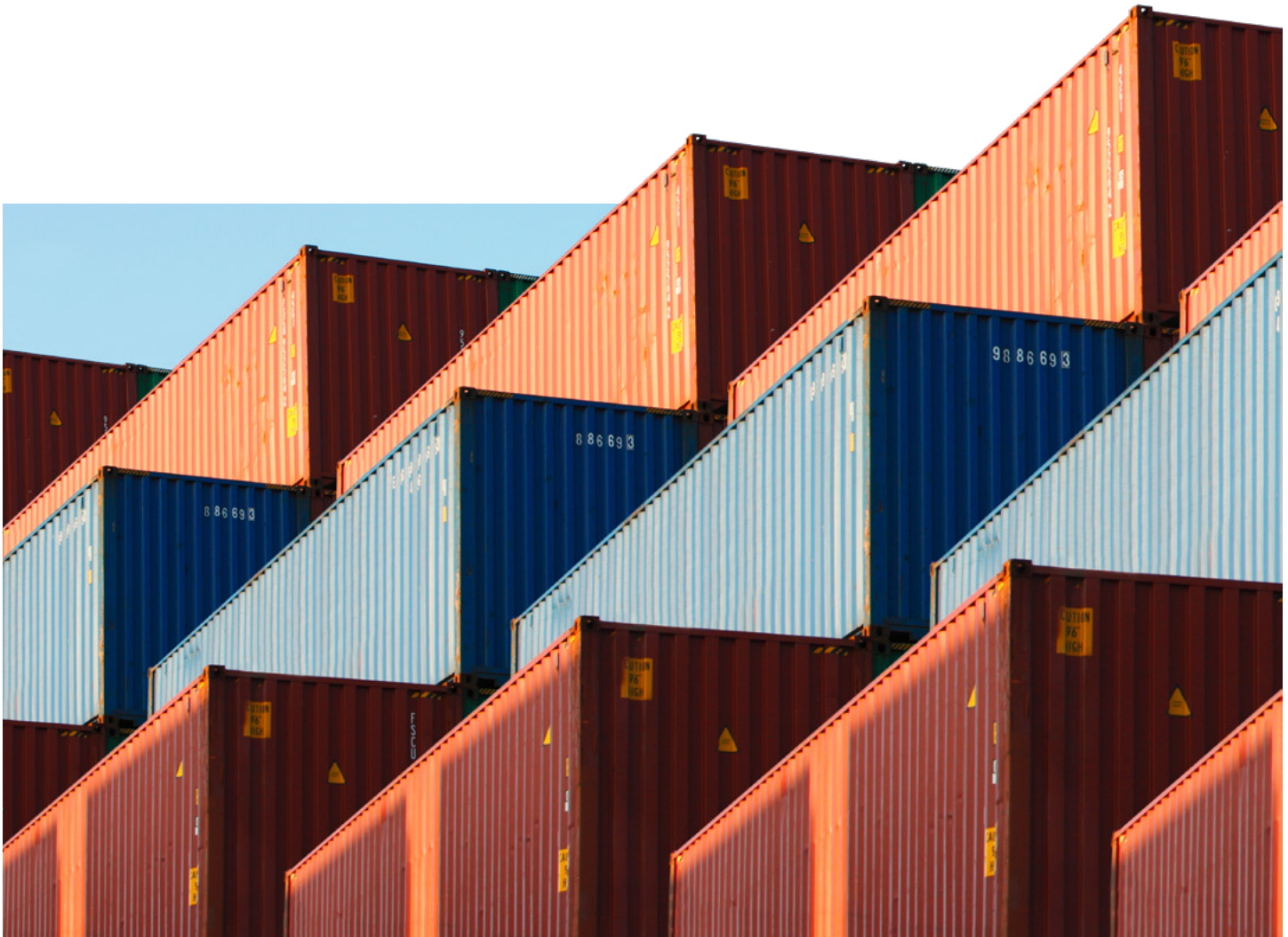
say their ability to operate was impacted by supply chain disruptions. The manufacturing sector is most concerned about such challenges.

64%

say that globalization is reversing with the resurgence of protectionism, supply chain disruption, and conflicts.

53%

view changing trade flows and friend-shoring as issues that need urgent attention.



An aerial photograph of a desert landscape, showing a road and a bridge over a river. The image is presented as a circular cutout within a larger, textured, brownish-gold background that resembles sand dunes or a desert floor. The road has a white dashed line down the center. A white car is visible on the bridge. The river flows through the landscape, surrounded by sparse vegetation and rocky terrain.

PART TWO

THRIVING AT THE INTERSECTIONS

→ *As the world grows more complex, leaders must recognize that disruptive forces don't exist in isolation. Rather, they form interconnected networks of loops and amplification. It's at these intersections that the most significant opportunities and challenges arise, and it's at these intersections where the greatest pockets of **known unknowns** and **unknown unknowns** lie.*

If they focus on disruptions as standalone issues, business and government leaders limit their ability to **take collective action and derive societal and economic value**. They must therefore expand their scope to consider the wider, and deeper, perspective.

Research has shown that, by focusing on intersections, organizations can engage in sharper thinking and analysis.¹¹ Understanding how different disruptions influence and amplify one another enables leaders to **identify emerging trends and anticipate future shifts, and to stay ahead of the competition** in ways that may not be apparent when viewing disruptions in isolation.

Our analysis is structured around the four intersections that generated the most fruitful discussions during the specialist workshops, regional roundtables, and symposium (see *Our research approach*). To reduce the complexity and ensure clarity in our calls to action, we've focused on the intersection of two disruptions at a time.

**AI REVOLUTION
&
TALENT
TRANSFORMATION**

Canada's ability to capitalize on the opportunities of AI is impacted by the difficulty businesses have competing for, hiring, and training the talent needed to adopt AI.

**GEOPOLITICAL
UNCERTAINTY
&
AI REVOLUTION**

In an environment of geopolitical uncertainty, the race for AI sovereignty and leadership is heating up. Canada is vying to lead globally in AI, govern to mitigate its risks, and protect against AI-enabled threats to democracy.

**TALENT
TRANSFORMATION
&
THE RACE
TO NET-ZERO**

Canada's ability to meet its global climate commitments will depend on building a workforce for the net-zero economy. Done well, its leaders can create great jobs, drive economic growth, and position the country as a net-zero leader.

**THE RACE
TO NET-ZERO
&
GEOPOLITICAL
UNCERTAINTY**

Geopolitical uncertainty is creating ambiguity for the energy sector, while presenting a potential area of competitive advantage for Canada: to supply the critical minerals necessary for net-zero solutions.

1. The intersection of

AI REVOLUTION & TALENT TRANSFORMATION

A skilled workforce is vital for capitalizing on the full potential of AI, but Canadian organizations face two challenges in this regard: fierce global competition for the highly skilled talent needed to deploy AI, and barriers to preparing their current workforce to use AI effectively.

TALENT TRANSFORMATION

Since 2020, the world of work has changed dramatically. Employers are now confronted with growing **shortages of both workers and skills**, caused by an aging population, rapidly changing skills needs, and evolving worker preferences.

THE RACE TO NET-ZERO

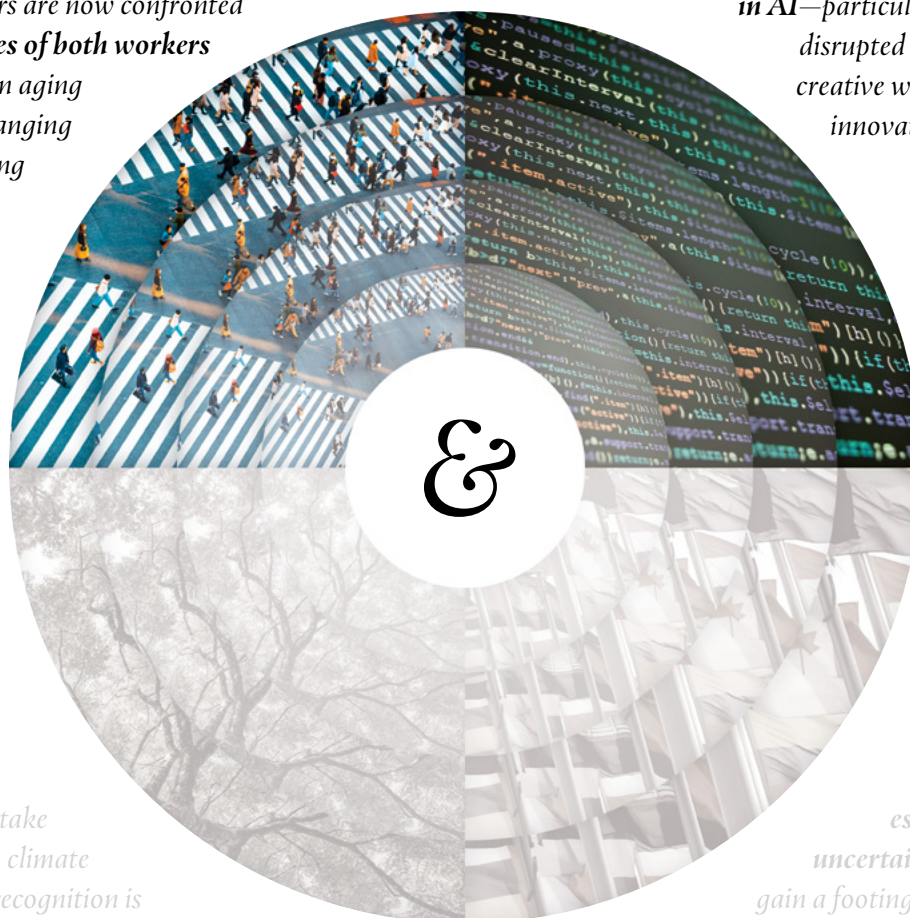
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A battle to hire Canada's world-class AI talent

Impact on Canada

Ranking third out of G7 countries in *AI talent concentration** in 2021-2022, Canada's AI talent base is world-renowned.¹² It also has a high growth rate in hiring for these skills compared to other G7 countries.¹³ Despite this, **Canadian startups and scale-ups in particular have difficulty hiring the talent needed to deploy AI.** A 2022 survey revealed that businesses anticipated the most pressing skills shortages over the following three years would be in analytics, cognitive computing, cybersecurity, general IT, and computer science.¹⁴ Additionally, a 2023 survey of large businesses identified limited AI skills and expertise as the top barrier hindering the successful adoption of AI.¹⁵

Why is it so hard for some organizations in Canada to hire AI talent? Because of the **fierce global and domestic competition** over them. According to a 2023 report, weekly job postings related to GenAI increased more than 450% worldwide compared to the previous year.¹⁶ This global demand is expected to continue rising, with projected employment growth of data analysts, big data specialists, AI/machine learning specialists, and cybersecurity professionals averaging 30% by 2027.¹⁷ The demand is rising in Canada, too. Indeed, a job search firm, found that 2.4% of Canadian job postings at the end of March 2024 included references to AI, up from 1.9% a year earlier.¹⁸ The number of actively engaged AI professionals in Canada also increased by 29% to reach 140,418 in 2022-2023.¹⁹

Skyrocketing demand has made it challenging for Canadian startups and scale-ups to compete for AI talent with foreign tech incumbents that already have a presence here. These companies can often offer **higher salaries, more ambitious projects, and better research and computing infrastructure.**²⁰ This has led to a localized brain drain, with talent either leaving Canadian companies for these foreign organizations or Canadian companies being acquired outright.

What skills are needed for deploying AI?

When it comes to making AI available for others to use, organizations need a range of both highly specialized technical skills and soft skills. On the technical side, programming, data science and analysis, and mathematics and science are essential. AI professionals also need soft skills, such as critical thinking, effective communication, and problem-solving, to communicate AI applications and demonstrate their business value.

Recommendations

Rethink strategies for attracting AI talent

In an environment of fierce competition over specialized AI talent, businesses need to think creatively about their hiring strategies. For example, they should seek applicants who have an aptitude for adaptive learning and a commitment to tackling hard challenges instead of focusing on those with a narrow set of skills, experiences, and educational paths. Talent with diverse academic, cultural, and experiential backgrounds can contribute unique perspectives and innovative solutions.

Creating a strong employer brand is another way to attract top talent. By highlighting the impact and value of AI projects and aligning them with organizational purpose, companies can showcase their commitment to innovation and problem-solving. Job descriptions and onboarding processes should highlight the company's investment in AI and emphasize the collaborative nature of working alongside the technology.

Work with universities to both access and develop talent

Businesses can benefit from forming long-term partnerships with post-secondary institutions to gain access to research expertise and graduate talent, while graduates can benefit from work opportunities and on-the-job experience. An example is the UK government's Knowledge Transfer Partnerships initiative, which connects forward-thinking businesses with educational institutions.²¹ The Government of Canada could support similar initiatives here, geared toward connecting startups and scale-ups to post-secondary institutions. Specifically, these partnerships can also be tailored to “near AI” talent—people with foundational digital skills who can be trained to become specialized AI professionals. Finland, for example, has successfully tailored training programs for people on the verge of acquiring AI expertise, offering them courses in emerging fields like data science and AI.²²

Meanwhile, educational institutions gain insight into what skills organizations need and therefore can develop specialized degree programs that enhance technical skills in a practical way. For instance, the University of Bahrain worked with AWS Educate's Cloud Degree initiative to offer specialized training in cloud computing for the next generation of cloud professionals.²⁵

Stem localized brain drain

The federal government should invest differently in the growth and success of Canadian startups and scale-ups. Other countries—the United States, United Kingdom, France, and Germany among them—have introduced rules on inbound foreign direct investment (FDI) to protect their strategic intellectual property (IP), data, and assets, which are key to growing a strong innovation ecosystem that attracts top talent. Canada's policies, however, prioritize funding incentives for large multinational enterprises, which inadvertently deprives small and medium-sized enterprises of the vital amount of talent and value generated by domestic research and development.

This needs to change. The Canadian government should modernize its approach to FDI to reflect the intangibles economy. The strategy should prioritize building a domestic market of first customers, including governments, to support the development of Canada-based high-growth startups and scale-ups. Increasing the availability of domestic capital would help these firms focus on their work, a topic that we address in our report [*Innovation at scale: Establishing Canada as a global leader.*](#)

Federal, provincial, and territorial governments should also work to open international markets for these entities.

Implementing restrictions on certain forms of foreign investment in strategically important areas would help safeguard Canadian innovation and national interests. To keep the balance between protecting homegrown innovation and attracting foreign investment, governments should continually experiment with policies such as patent boxes and IP rules.²⁴ In a step forward, the federal government started consultations in January 2024 to create a patent box regime. Cultivating an ecosystem that nurtures the growth of AI innovation in Canada will allow organizations here to offer the type of highly sought-after positions that top AI talent is looking for.



A struggle to prepare workforces for AI-driven change

Impact on Canada

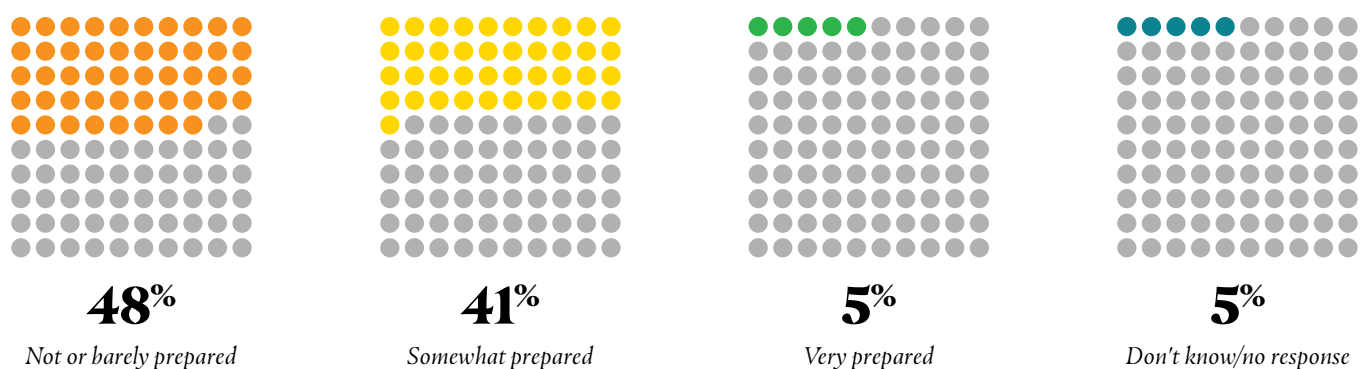
Deploying AI is only part of the equation. To harness its potential, organizations also need **workforces equipped with the skills to integrate AI throughout operations.** The private and public sector in Canada face challenges in this regard, as well.

One obstacle is that workforces lack the foundational digital skills to work alongside AI and effectively incorporate the technology into day-to-day operations. According to our recent research, nearly half (49%) of business leaders find it somewhat or very challenging to hire and retain digitally skilled workers.²⁵ Similarly, we found that 48% feel their employees are barely or not at all prepared to use AI or GenAI tools, with only 5% indicating their employees are very prepared (see Figure 1).

And Canadian organizations are struggling to address these skills gaps. **They lag behind their international counterparts in developing their staff’s digital competencies**—in 2021, Canada ranked 25th out of 29 countries in terms of businesses offering training to develop information and communications technology (ICT) skills for non-ICT specialists.²⁶ Only 11.3% of Canadian businesses with 10 or more employees provided such training, significantly lower than the OECD average of 19.5%.²⁷ Additionally, our survey revealed that only 32% of organizations see themselves as “highly effective” in providing professional development opportunities to attract and retain top talent. This is especially problematic considering the rapid advancement of AI technologies and the

correspondingly rapid shift in skills needs. Businesses also face obstacles related to **appetite for change and willingness to take risks** at the workforce and leadership levels. The cost of driving organizational change during digital transformation is a significant concern for business leaders, as highlighted in [*Digital equity: empowering all organizations to succeed in the digital era*](#). Employee support for enterprise change has seen a significant decline, dropping to just 43% in 2022 compared to 74% in 2016, brought on by high rates of burnout and fatigue.²⁸ This reluctance to change hinders the development of a workforce’s growth mindset, impeding the transition to an environment that thrives on curiosity, innovation, and continual adaptation—an AI environment.

Figure 1: How prepared are your employees to use AI and/or GenAI tools?



Recommendations

Create an action plan to build workers' skills in AI

Leaders need to rethink their traditional approach to skills development and workforce planning. Preparing employees for the skills needed to adopt AI throughout systems and processes is a significant undertaking and requires leadership that embraces risk-taking, enabling companies to move beyond limited applications and implement organization-wide solutions.

With this mindset, organizations can map a three-point path to an AI-skilled workforce:

1. Shift the workforce strategy to be skills-based rather than role-centred to enhance the organization's agility and adaptability to AI advancements.²⁹ By disaggregating jobs into tasks and skills, leaders can better understand the specific skills the organization needs and take a more flexible approach to meeting them.
2. Undertake a comprehensive assessment of the existing skills as well as those that will be needed, now and in the future. This can be done by developing an inventory of skills and identifying which are in high demand but short supply. The organization can then determine which of these skills should be automated, augmented, or developed.
3. Once there is a clear sense of which skills need to be developed, determine an upskilling approach. AI-driven **adaptive learning**, which uses continual assessments and algorithmic adjustments, tailors the learning process to each employee's unique needs and learning speeds. Hosted on digital platforms, **opportunity marketplaces** empower employees to locate internal projects and roles that allow them to learn new skills on the job and find opportunities to shape their own career trajectories.

To automate, augment, or develop?

Automate: Some tasks can be automated by AI, freeing up employees to focus on higher-value activities—relationship-building, complex problem-solving, and creative thinking, for example. Tasks AI can replace include data entry, routine quality control, inventory management, and simple data analysis.

Augment: Other skills can be augmented and amplified by AI, with employees working alongside to enhance activities such as advanced data analytics, content creation, and strategy development. GenAI in particular has demonstrated immense potential to disrupt the way we work; recent research reveals that, globally, this advanced technology could transform 40% of people's working hours.³⁰

Develop: The age of AI also creates the need for completely new skills, such as bias detection, ethical governance, and prompt engineering. Organizations need to keep up to date with identifying emerging AI skills needs to stay adaptable and ready to tackle the evolving challenges and opportunities.³¹

See our recommendations for Canada's approach to upskilling for the [talent transformation](#) & the [race to net-zero intersection](#).



Incentivize business investment in AI training for employees

Government incentives can also encourage employers to prepare their employees for the AI-driven economy. One of the most successful examples is Quebec's Working Skills Act, commonly known as the 1% Training Law, which has been instrumental in promoting employer-sponsored training in the province. This legislation mandates that businesses with payrolls of \$2 million or more dedicate 1% of that payroll either to training their employees via recognized institutions or to the province's Workforce Skills Development and Recognition Fund. The result has been an increase in both the quantity and quality of employer-sponsored training—in fact, 80% of companies now provide job-specific training, the highest among all provinces.³² While Quebec's approach does not focus specifically on equipping employees with AI skills, it could be replicated by other provincial or territorial governments, perhaps with a focus on incentivizing digital skills training.

2. The intersection of

GEOPOLITICAL UNCERTAINTY & AI REVOLUTION

Intensifying geopolitical competition and uncertainty are complicating the AI landscape, creating three key challenges for Canada. There's the strong competition for strategic AI resources, including data, software, and hardware. The race to govern AI adds another competitive element, as nations seek to be first to establish rules for the digital world. And the evolving risks associated with AI—including misinformation, disinformation, and malinformation (MDM) enabled by technology—are threatening democracy and institutional trust at home and around the world.

TALENT TRANSFORMATION

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THE RACE TO NET-ZERO

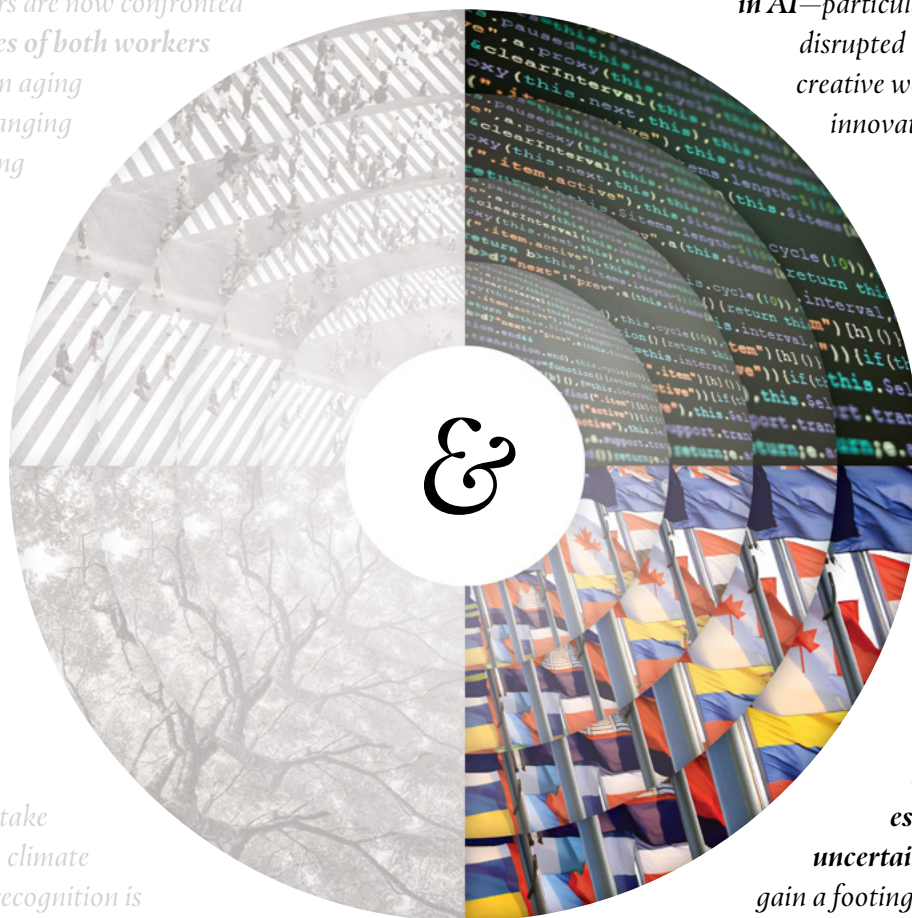
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*Global power dynamics are in flux, leading to an **escalation in geopolitical uncertainty**. As countries seek to gain a footing or secure advantages in this environment, we're seeing far-reaching repercussions on **supply chains, trade, and security**.*



Harm from the global pursuit of AI sovereignty

Impact on Canada

Growing geopolitical ambiguity and mistrust between nations has **sparked a race for sovereignty of AI**, which refers to a country's attempt to control as much of the global AI supply chain, including data, software, and hardware, as possible.⁵³ This race has led countries to prioritize establishing their leadership in AI and ensuring reliable access to key materials, such as semiconductor chips, for themselves.

Some nations have already moved to expand their control, which has provoked responses that could squeeze Canada. For example, China's ambition to achieve 70% self-sufficiency in critical technology by 2025 prompted the United States to take measures to maintain its own technological dominance.⁵⁴ The rising tensions between these powers—the intensifying dispute over Taiwan being a prime example—could potentially jeopardize Canada's access to crucial materials. The Taiwan Semiconductor Manufacturing Company (TSMC) produces over 90% of the world's most advanced AI chips, which are critical for modern AI.⁵⁵ A disruption in chip production if the conflict over Taiwan erupts could have a global economic impact estimated at US\$1 trillion per year in the first

few years, if the entire industry is affected.⁵⁶ As Canada's tenth-largest trading partner in 2021, Taiwan has close commercial ties.⁵⁷ Integrated circuits, a type of chip, are the third-largest Taiwanese export to Canada, indicating that **a supply disruption would not only damage the global AI ecosystem but also weaken Canada's ability to lead in AI research and development.**⁵⁸

Canadian research may also be a target for countries seeking to strengthen their own AI leadership. Public Safety Canada has warned that new threats are emerging—for instance, foreign funding partnerships with Canadian academic and research institutions can be used to access cutting-edge technology and IP.⁵⁹ Indeed, in January 2024, the Government of Canada released a list of foreign research institutions and organizations that may pose a threat to national security and sensitive research, naming 85 Chinese, 12 Iranian, and six Russian entities.⁴⁰

Despite these risks, **the current environment also presents an opportunity for Canada:** to supply the materials other nations need for their AI systems. The federal government has invested

\$150 million in semiconductor development and \$90 million in the National Research Council of Canada's Canadian Photonics Fabrication Centre, the only publicly operated semiconductor factory in North America.⁴¹ Yet these investments aren't on the same scale as those made by some countries. The United States, for example, has announced US\$52.7 billion in funding through its CHIPS and Science Act to expand semiconductor manufacturing.⁴²

Recommendations

Position Canada as a leader in the global semiconductor industry

Canada can establish itself as an essential part of the semiconductor value chain, but it must move quickly to not miss out as other countries rapidly expand in this space.

To start, more investment is needed. The managing director of Canada's Semiconductor Council calls for at least 10% of what the United States has put forward, or around \$5 billion.⁴³ This won't enable Canada to be self-sufficient in semiconductor manufacturing, but it would allow it to carve out a vital role in the supply chain within its means. For instance, manufacturers could focus on specialized chips rather than advanced chips—a facility to produce the former would cost between \$500 million and \$2 billion to build, while a facility for latter would require \$20 billion.⁴⁴ An example of a specialized chip is photonic semiconductors, which can be used for 5G communications. With this focused approach, Canada can act as a complementary economic partner with countries like the United States and Taiwan rather than as a direct competitor.

These efforts to build semiconductor capacity will require greater collaboration between the private and public sectors. By working together, businesses and governments can leverage their resources and expertise to drive economic growth, improve the supply chain, and increase research and development. Businesses should also diversify their international semiconductor suppliers to reduce risk if one of them faces delays or other obstacles.

Protect AI research from espionage

The pursuit of AI leadership and self-sufficiency heightens risks in innovation and research. To protect against foreign interference, espionage, or unwanted knowledge transfers, the Government of Canada should go a step beyond identifying potential security threats to Canadian universities, startups, and scale-ups by taking measures to counter these threats. It should take an interdepartmental approach and conduct a forward-looking analysis of where Canada wants to be in the next decade, allowing the federal government, provincial and territorial governments, and at-risk institutions to make the necessary investments in security, regulatory, and legislative changes to realize this vision.⁴⁵

A need to catch up on AI governance

Impact on Canada

AI governance is becoming the next frontier of geopolitical competition. **As countries vie to lead in AI innovation and development, they're also racing to establish governance frameworks** as the pressure mounts to create the regulations that protect people and their personal data—and to influence global standards of AI development and application. The European Union, the United States, and China, among others, are already adopting regulatory approaches. Each has its own set of values, protections, and incentives:

- ♦ The European Union has taken a *rights-based approach*, centred on the rights of users and citizens. It's considered ahead of the curve on AI regulation, with the relevant European Parliament committees having voted in February 2024 to adopt the proposed AI Act. The full European Parliament votes on it in April 2024.⁴⁶
- ♦ China is pursuing a *state-driven, hands-on approach* as part of an ambitious effort to position itself as the world's technology superpower.⁴⁷ The country's temporary regulatory measures, effective in August 2023, require service providers to receive security clearances before releasing large-scale AI products and hold developers responsible for prohibited or illegal content generated by GenAI.⁴⁸
- ♦ The United States has taken a *market-focused approach*, using non-binding and voluntary principles to promote AI innovation and progress. Due to its difficulty reaching a consensus at a national level, the White House has taken leadership through an Executive Order on the safe, secure, and trustworthy development and use of AI, as well as its Blueprint for an AI Bill of Rights.⁴⁹

Compared to these countries, Canada's regulatory approach can be characterized as *risk-based*.⁵⁰ In June 2022, the federal government introduced the Artificial Intelligence and Data Act (AIDA) as part of the Digital Charter Implementation Act, also known as Bill C-27.⁵¹ Critics argued that AIDA, which isn't expected to come into force until at least 2025, was too short on details, leaving important aspects of the rules to be decided after the law is passed (if it is). Since then, amendments based on feedback from experts have improved the bill's specifics.⁵²

Without strong AI governance measures, **Canada risks losing a meaningful seat at the table when it comes to influencing global AI standards.** In its absence, other countries will set the rules—potentially in ways that run contrary to Canadian values. But nor should Canada rush, which could put us at risk of being saddled with a governance model that strays too far from emerging global norms, isn't interoperable with other countries, and quickly becomes outdated.⁵³

Recommendation

Introduce AI governance and enhance agility

Canada faces the challenge of both keeping pace with AI advancements and ensuring that AIDA is drafted in a way that effectively protects Canadians' personal data. The government describes this act as agile since many of its details can be defined in the future, allowing flexibility to adapt to AI advancements.⁵⁴ However, critics argue this may not be accurate as regulations can take years to develop or even fail altogether. Clear processes should be outlined to measure the impacts of the regulations and adjust approaches as needed. Striking a balance between speed and effectiveness can strengthen the country's leadership in AI governance.

In addition, Canada can learn from other countries to keep pace with emerging AI risks. For instance, the United Kingdom's non-statutory AI regulatory principles are similarly meant to take an agile and iterative approach, leaving details to be determined by future regulations.⁵⁵ Canada should closely monitor the regulations, frameworks, and approaches of other countries to learn from their approaches and ensure interoperability with their AI regulations.

As the technologies continue to evolve, business and government organizations must actively embrace human-centred, responsible, and ethical AI principles. This involves creating awareness and agreement within the organization on what ethical AI means, followed by continual testing and monitoring of AI models for biased or unfair outcomes and privacy violations.⁵⁶ Furthermore, employees who are working with AI must have a level of knowledge that allows them to understand the outcomes of these models. This can help organizations navigate while awaiting regulatory guidance.

AI-related skills and talent needs are explored in the [AI revolution & talent transformation intersection](#).



AI-enabled misinformation is undermining trust and democracy

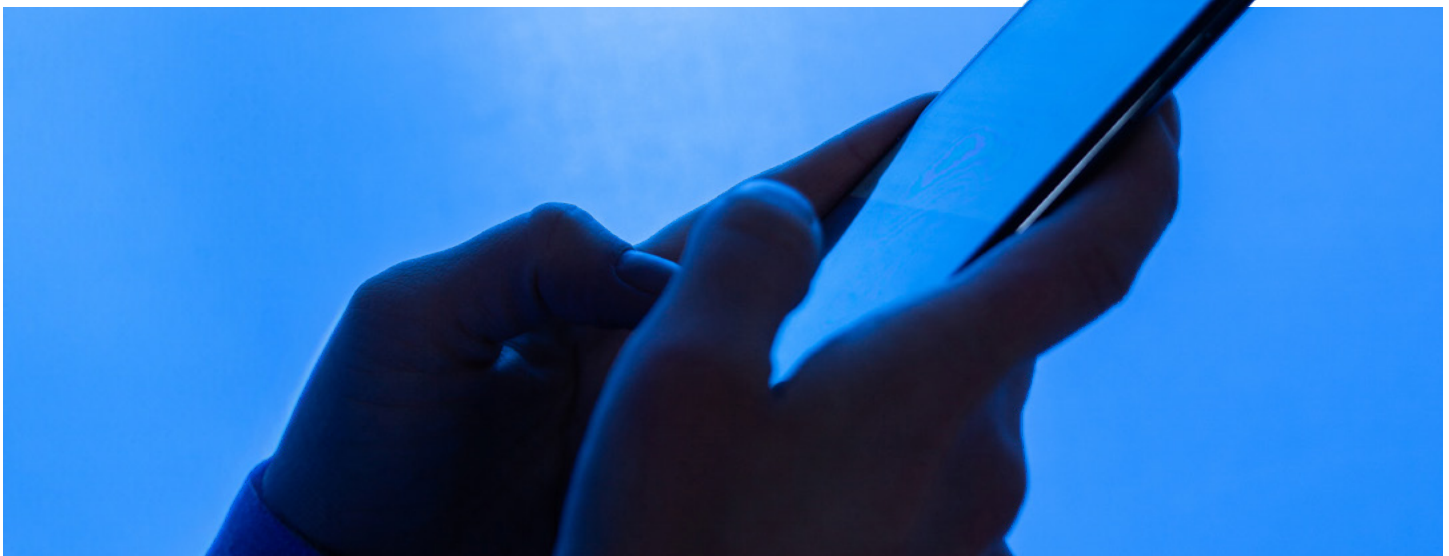
Impact on Canada

Recent developments in AI, including GenAI, have enabled **increasingly sophisticated forms of misinformation, disinformation, and malinformation*** (MDM), which can spell dramatic consequences for institutional trust and democracy. The technologies are being used by bad actors to manipulate public opinion and election outcomes by discrediting factual information and spreading false or misleading information, often through methods like deepfakes or other manipulations. State and non-state actors are increasingly using AI to advance their geopolitical interests, while AI is making such content easier to produce and harder to detect.⁵⁷

The impact of AI-powered MDM is immense. The cybersecurity firm Darktrace reported a 135% global surge in novel social engineering attack emails in the first two months of 2023. These attacks used sophisticated linguistic techniques, facilitated by GenAI like ChatGPT.⁵⁸ The Canadian Centre for Cyber Security (Cyber Centre) estimates **the global economic cost of MDM is in the billions**, while its 2023 National Cyber Threat Assessment predicted that Canadians' exposure to MDM will almost certainly increase over the next two years.⁵⁹ The Cyber Centre also said it's very likely that foreign adversaries and hackers will use AI to influence voters ahead

of the next federal election.⁶⁰ As the frequency and severity of such incidents continue to rise, geopolitical tensions are likely to heighten.

** The Government of Canada defines misinformation as false information that isn't intended to cause harm; disinformation as false information that is intended to cause harm; and malinformation as information that stems from the truth but is exaggerated to cause harm.*



Recommendation

Fight the impact of misinformation on elections

To counteract election interference through AI-powered MDM, the federal government should strengthen its ability to monitor and alert the public to threats to its elections.⁶¹ In 2019, it established the Critical Election Incident Public Protocol (CEIPP) to do just this, but it has been criticized for not flagging fake content and foreign interference during the past two elections.⁶¹ The CEIPP is tasked with notifying citizens of incidents that threaten a free and fair election, but experts have recommended the threshold be lowered so that alerts can be issued even when there is only a potential effect. The federal government could also follow the United States' approach of requiring AI-generated content to be watermarked, which would help users identify real and fake content.⁶²

Governments, educational institutions, and social media platforms should also collaborate to improve Canadians' literacy of and resilience to MDM.

- ♦ **Governments** can use methods like “*prebunking*”^{*} to get ahead of expected MDM. Before elections, for example, they can launch educational campaigns about how ballots are counted.⁶⁵ Importantly, these campaigns should focus on improving the public's ability to critically assess the information they consume and understand why they may be susceptible to believing misinformation.
- ♦ **Educational institutions** can start teaching students at a young age about MDM. Finland consistently ranks first among European countries in teaching resilience to MDM, which can be attributed to its strong education system that emphasizes media literacy.⁶⁴
- ♦ **Social media platforms** must take an active role in public education, especially for their users who rely heavily on them for news. While some companies have made efforts to require content creators to disclose altered or synthetic content, more oversight is needed to ensure Canadians are informed when they come across this content.

^{*} While *debunking* refers to exposing a claim that is false, *prebunking* is teaching people how to spot false claims.

3. The intersection of

TALENT TRANSFORMATION & THE RACE TO NET-ZERO

Canada has made significant commitments to and investments in the transition to net-zero emissions, but our ability to meet our targets is being hindered by the lack of a comprehensive national workforce strategy to ensure Canadians are prepared for a clean energy economy. As the new jobs necessary for the transition are created, we have a chance to ensure that demographic groups that are historically underrepresented in the sector are able to share in the net-zero career opportunities.

TALENT TRANSFORMATION

Since 2020, the world of work has changed dramatically. Employers are now confronted with growing **shortages of both workers and skills**, caused by an aging population, rapidly changing skills needs, and evolving worker preferences.

THE RACE TO NET-ZERO

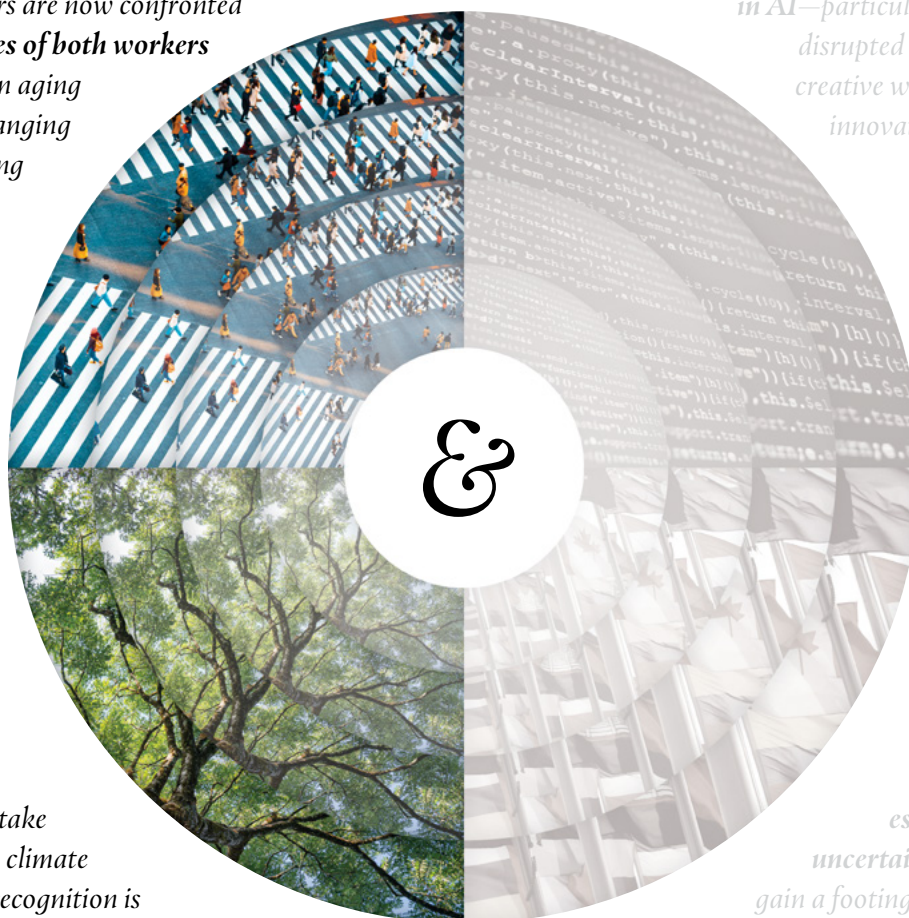
We have reached an **inflection point**: we're running out of time to take tangible action to slow climate change. This growing recognition is prompting accelerated efforts worldwide to **achieve a net-zero future**.

AI REVOLUTION

In recent years, the **explosion of advancements in AI**—particularly Generative AI—has disrupted activities from coding to creative work to health care. These innovations are revolutionizing how humans interact with technology.

GEOPOLITICAL UNCERTAINTY

Global power dynamics are in flux, leading to an **escalation in geopolitical uncertainty**. As countries seek to gain a footing or secure advantages in this environment, we're seeing far-reaching repercussions on **supply chains, trade, and security**.



Workers are unequipped to work in the net-zero economy

Impact on Canada

To successfully transition to a net-zero economy, Canada's labour force needs a combination of technical and soft skills. The good news: research finds that most are not necessarily new skills, but rather existing ones that can be applied with a net-zero lens.⁶⁵ In fact, 77% of cleantech companies said they would find value in training that put a cleantech lens on common workforce skills.⁶⁶ While **Canada's workforce already has many of the skills needed for a net-zero economy**, the way these skills are applied will change. New occupations—carbon capture technicians and hydrogen fuel cell designers, to continue with the cleantech example—will require a combination of traditional technical skills (e.g., installation and technology design) and social skills (e.g., coordination, management, and service orientation).⁶⁷

However, business and government leaders face challenges in determining what skills are required, the skills the workforce already has, and **how to bridge the gap between them**. This lack of clarity hampers the training of the next generation in future skills needs and prevents businesses from upskilling their workforces and being competitive in the net-zero economy.

Amid this workforce planning challenge, demand for workers with the skills to support the transition is already sharply increasing. *Green jobs** are now in higher demand than other jobs, with a growth rate of 10.3% more between Q1 2019 and Q1 2022.⁶⁸ This trend will continue, since climate action is expected to create between 28,000 and 300,000 new jobs in Canada by 2030, with **the construction and manufacturing sectors experiencing the highest growth**.⁶⁹

These sectors, which are vital for the net-zero transition, also have the greatest labour shortages. By 2030, manufacturing may require an additional 164,000 workers and construction 236,000 more.⁷⁰ These figures take into account the growth in demand for these roles, existing labour shortages, and projected retirements. Other sectors crucial for the net-zero transition are struggling with skills shortages, as well. These include the mining sector—essential for supplying the critical minerals needed—and the oil and gas sector, which will require talent with the skills to ramp up decarbonization efforts.⁷¹

Two factors are contributing to the current shortages. One is **heightened competition for skilled workers** with countries like the United States. Its Inflation Reduction Act (IRA), which offers substantial subsidies in clean energy and other sustainability-related programs, is projected to help create 537,000 new jobs annually over the next decade, which will attract skilled workers from Canada.⁷² Another factor is the **stigma and lack of awareness about careers in skilled trades, energy, and natural resources**, which leads many young people to pursue post-secondary degrees over apprenticeships or vocational training. In the case of skilled trades, despite the recognized importance of this career path, there's an unfounded belief that it is inferior or a backup option. Surveys show that while 96% of Canadians agree more skilled trades workers are needed, 76% say they would never pursue such a career.⁷³

*In this study, the OECD defines green jobs as those that have a significant proportion of green tasks, as determined by O*NET classifications. Green tasks are defined as those that contribute to environmental objectives, such as preserving the environment and reducing emissions.

Recommendations

Develop and implement a comprehensive net-zero skills strategy

Canada needs a comprehensive and ambitious skills strategy that connects the dots between kindergarten and secondary school, post-secondary education, on-the-job training, and immigration targets. While the Sustainable Jobs Act aims to create positions specific to the economy, it has been criticized for a lack of details and clear plan. A skills road map would equip public and private sector organizations to prepare the current and next-generation workforce for a net-zero economy.

- ♦ **Training the next generation:** Educational institutions are naturally central to developing the future pool of skilled workers. Some are already on that—the University of Calgary has a new Sustainable Systems Engineering program and the Université de Montréal offers a specialized graduate program in environmental studies and sustainable development. Businesses can partner with educational institutions to help provide students with the skills and knowledge they need to join Canada's path to net-zero.
- ♦ **Upskilling workforces:** To ensure current employees have the necessary skills for both now and the future, businesses must identify their staff's skills gaps and offer opportunities

for on-the-job training. General Motors is one example: it launched the Automotive Manufacturing Electric College, which equips employees to produce and design EVs.⁷⁴

- ♦ **Attracting talent from abroad:** Immigration is another key part of a successful skills strategy. Provinces and territories can align their nominee programs with place-based policies and create supporting programs. For example, they can look to the Atlantic provinces, which implemented the Atlantic Immigration Pilot to attract and retain skilled workers in the region. Establishing a specific category for green jobs within the North American Industry Classification System would also enhance Canada's ability to measure demand for these roles.⁷⁵

Enhancing the tracking, analysis, and dissemination of labour market data is also crucial for the effective implementation and measurement of this strategy. France's National Observatory of Jobs and Skills in the Green Economy (Onemev) serves as a useful example. Onemev monitors employment trends and enhances knowledge on jobs and occupations within the green economy by bringing together various institutions, including relevant ministries, agencies, research bodies, and employment service organizations.⁷⁶ Robust labour market data is also essential for ensuring governments and employers are making the right investments in supports for affected workers.

What skills are needed to reach net-zero?

*According to a 2022 Future Skills Centre report, the top five skills needed for the net-zero economy are **social and cognitive skills**, including critical thinking, monitoring, coordination, judgment and decision-making, and complex problem-solving.⁷⁷ **Technical skills**, such as operations monitoring and quality control, will continue to be necessary in sectors like construction, manufacturing, and other skilled trades. These are not new, but they are being applied to a new range of cleantech tasks.⁷⁸*

Attract talent to skilled trades careers

Educational institutions, trades industries, and unions can collaborate to advance awareness of skilled trades careers, reduce stigma, and create opportunities for hands-on experience. An example is Cambrian College in Ontario, which holds an annual event called Jill of All Trades to encourage female high school students to try different trades and learn about career paths.⁷⁹ In British Columbia, the Build Green Together project introduces high school students to careers in construction.⁸⁰ Expanding these hands-on opportunities into other provinces and territories would help ensure students nationwide have access to them and gain awareness of skilled trades as a viable, exciting career.

Immigration is another way to fill the gap. In 2023, the federal government introduced category-based draws in its Express Entry program, prioritizing trades as one of six categories.⁸¹ However, in the first half of 2023, only 4% of the government's invitations to apply were in the trades category.⁸² That proportion must be increased to meet the increasing demand. Businesses should also work to attract and support immigrants in these fields by targeting their recruitment efforts, providing language and cultural training, and supporting credential recognition. By tapping into the global talent pool, Canada can benefit from the diverse perspectives and experiences that immigrants bring to the workforce as well as address the skilled trades shortage.



The benefits of net-zero opportunities are not evenly distributed

Impact on Canada

Job opportunities in the transition to net-zero are spread unevenly. For example, the *environmental and clean technology** (ECT) workforce has a severe underrepresentation of women, Indigenous Peoples, racialized people, and immigrants (see Figure 2). If current employment patterns persist, these groups will not benefit proportionately from the new investments in the coming decades. This lack of representation is a missed opportunity for Canada to chart an inclusive path to net-zero.

Despite their communities often being disproportionately affected by climate change, **Indigenous Peoples are particularly underrepresented in the ECT sector**. Systemic barriers to education and training, lack of access to capital for entrepreneurship,

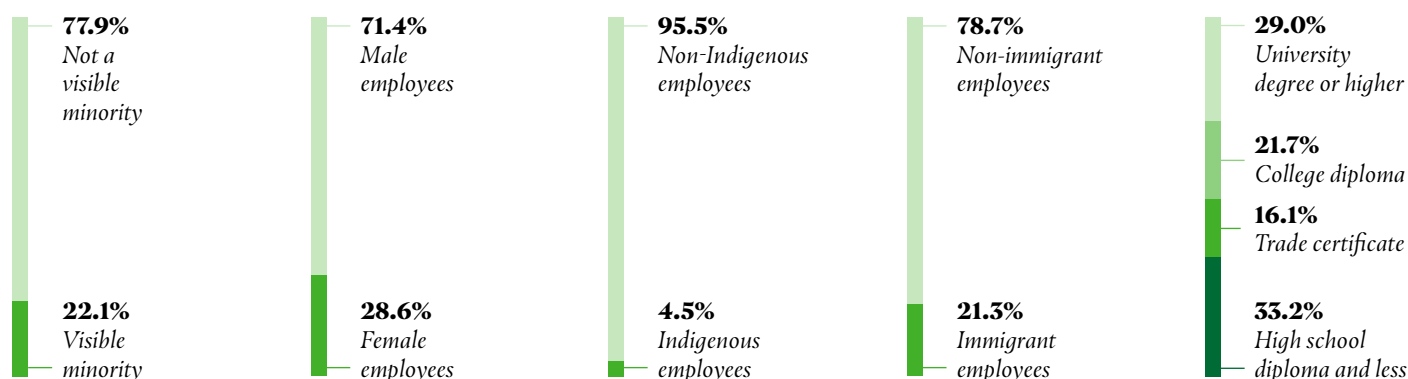
and limited opportunity to participate in decision-making processes related to energy development are some of the challenges they face. As a result, their communities are more frequently excluded from the benefits of the transition to net-zero, including job creation and economic development.

Despite these barriers, **Indigenous communities are stepping into a leading role** in a variety of projects important to the net-zero transition. As one example, Indigenous Clean Energy, a not-for-profit that advances Indigenous leadership in the energy transition, estimates that 20% of Canada's electricity-generating infrastructure is owned or co-owned by Indigenous communities.⁸⁴ Indigenous communities are also taking a leading role in mining

critical minerals: Denendeh Exploration and Mining Company Ltd. (DEMCo), for example, is a First Nation-owned mineral exploration and mining company that has identified opportunities to mine iron-oxide-copper-gold (IOCG) in the Northwest Territories.⁸⁵ Barriers to Indigenous leadership in these types of projects must be addressed to promote economic reconciliation and ensure an inclusive transition to a healthier planet.

* According to Statistics Canada, the ECT sector includes the environmental subsector (environmental goods and waste management and remediation services) and the clean technology subsector (clean technology and clean technology services).

Figure 2: Employment in the environmental and clean technology sector by demographic characteristic (2021, % of total jobs)



Source: Deloitte analysis of Statistics Canada data (Table 36-10-0691-01).⁸⁵ Notes on Statistics Canada data: Totals may not add up to 100 due to rounding. Prior to the 2021 Census, the category 'female employees' refers to women; starting in 2021, this category includes women, as well as some non-binary persons. Prior to the 2021 Census, the category 'male employees' refers to men; starting in 2021, this category includes men, as well as some non-binary persons.

Recommendation

Create opportunities for equal access to high-quality net-zero jobs

To ensure an equitable transition to a net-zero economy, it's important underrepresented groups have access to training that equips them with the skills they need for the well-paying jobs that will be created. Businesses can work closely with their employees and unions to understand their needs and offer support, such as partnering with training providers to offer targeted programs, time off for training, and financial incentives to complete programs.

Beyond training, businesses should also explore ways to make their job opportunities, onboarding programs, and workplace environments inclusive and welcoming to underrepresented groups. The second report in Deloitte's *Voices of Indigenous youth leaders on reconciliation* series, [*Bridging study and work for long-term success*](#), delves deeper into ways to reduce systemic barriers for Indigenous youth as they transition from education to career.

For their part, governments can help lower access barriers by funding more sector- and region-specific programs that offer a range of supports, such as training, mentorship, and job placement services. Programs that aim to connect young people with positive role models from a range of backgrounds can help reduce stereotypes and promote inclusion. Setting targets for such programs can also be effective; for instance, Enbridge is aiming to reach a workforce comprising 40% women and 28% underrepresented racialized groups by 2025.⁸⁶ The Mining Association of Canada has also published the Towards Sustainable Mining protocol, a mandatory set of requirements for members that aims to improve performance on diversity, equity, and inclusion.⁸⁷

By working together, businesses, employees, unions, and governments can help to ensure that everyone has an equal opportunity to participate in the transition to a net-zero economy and the skills and support they need to thrive in the clean energy jobs of the future.

4. The intersection of

THE RACE TO NET-ZERO & GEOPOLITICAL UNCERTAINTY

As global power dynamics shift, geopolitical uncertainty is impacting Canada's path to net-zero in two important ways. The uncertainty facing Canada's future energy mix is one, as geopolitical conflicts grow. The second is the threat of trade tensions and supply chain disruptions to Canada's access to the critical minerals needed for net-zero solutions—yet, simultaneously, this threat presents an opportunity to capture a competitive position in the critical minerals value chain.

TALENT TRANSFORMATION

Since 2020, the world of work has changed dramatically. Employers are now confronted with growing **shortages of both workers and skills**, caused by an aging population, rapidly changing skills needs, and evolving worker preferences.

THE RACE TO NET-ZERO

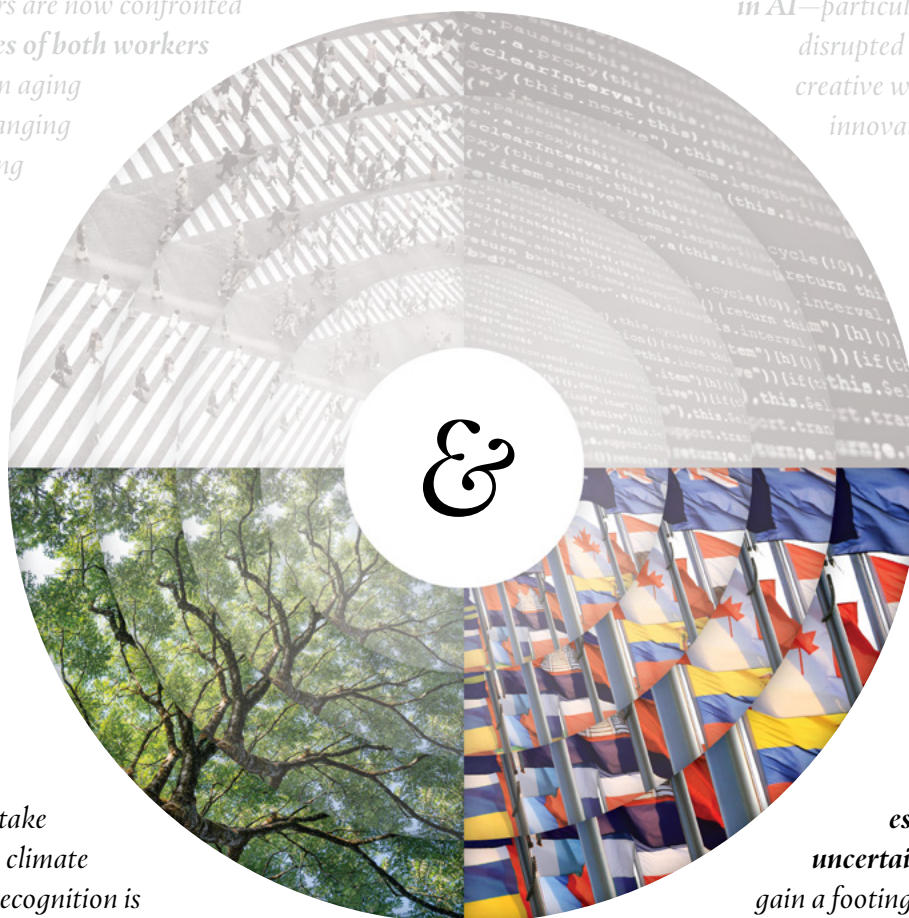
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Uncertainty about Canada's future energy mix is complicating efforts

Impact on Canada

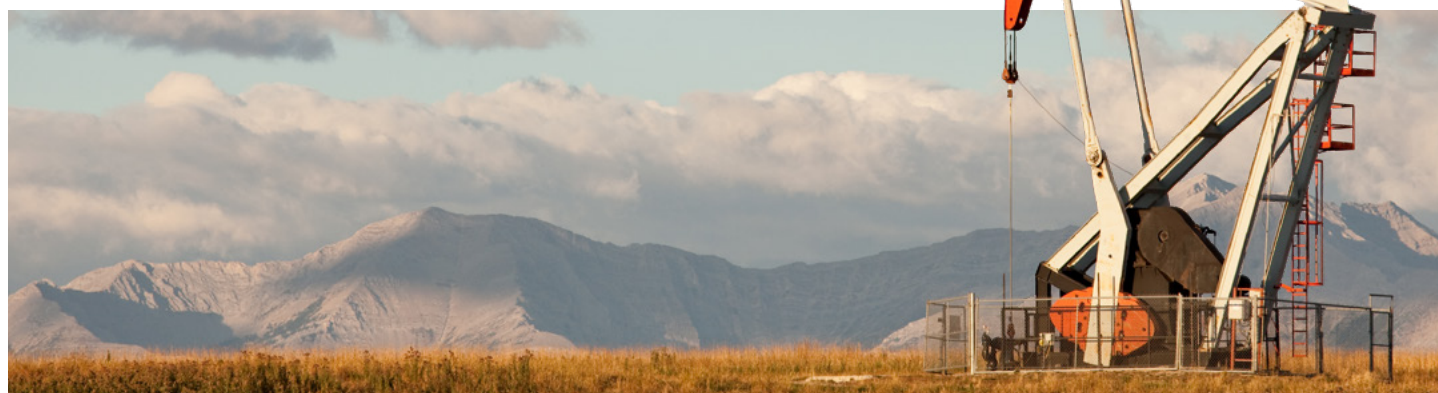
In recent years, **events with global consequences have heightened ambiguity** about the world's energy supply. At the start of the pandemic in 2020, crude oil prices dropped due to reduced activity, then began to steadily rise the following year. The market was again rocked when Russia, a major exporter of oil and gas, invaded Ukraine in 2022. Many countries responded by sanctioning Russian exports, which created a surge in global demand for non-Russian oil and gas.⁸⁸

In response, Canada pledged in March 2022 to increase oil production by 200,000 barrels a day and natural gas by 100,000 barrels a day by year-end.⁸⁹ While it fell short of this target, oil and gas production has significantly increased. Canadian exports of crude oil reached a record high in 2023, while annual gas production was the highest it had been since 2016.⁹⁰

An increase in exports of lower-emission energy, such as liquefied natural gas, to allies who are dependent on higher-emission energy sources has also been proposed as a way to improve global energy security, reduce other countries' carbon emissions, and boost economic growth at home. At the same time, **Canada continues to work toward decarbonizing the oil and gas sector to meet its net-zero ambitions.** Businesses are investing in decarbonization technologies—such as carbon capture, utilization, and storage (CCUS)—but questions remain around the future cost and effectiveness of these methods.⁹¹

The evolving energy landscape has also prompted many countries to accelerate their adoption of clean energy. Global investment has risen by 40% since 2020 as countries aim to reduce their reliance on oil

and gas and work toward net-zero goals.⁹² Canada's energy sector is similarly investing in clean energy and diversifying its energy mix in pursuit of the same goals. Yet the considerable uncertainty around the long-term cost and effectiveness of some energy sources is a major barrier. For example, low-carbon hydrogen can be produced and used with little or no GHG emissions. But, depending on how the cost of related technologies pan out, the Canada Energy Regulator projects that hydrogen use in Canada could range from one million tons to 9.5 million tons in 2050.⁹⁵ **This ambiguity poses challenges for Canadian businesses looking to invest.**



Recommendations

Support investments in clean technology and decarbonization

Canada's energy and clean technology sectors are affected by events in other parts of the world and market swings that are beyond their control. Government can and should take measures to reduce uncertainty within Canada's own borders to help producers better navigate global fluctuations. For example, the federal government can reduce uncertainty and investment risk for businesses by setting clear and consistent long-term targets, striving for consensus with provincial and territorial governments, and creating a strong investment environment. In fact, it did so in the 2024 budget, advancing the implementation of several clean technology-targeted investment tax credits.

For their part, oil and gas producers are already leading the way in decarbonization. Despite geopolitical uncertainty, they should continue to explore innovative ways to decarbonize their operations, reduce risk, and enhance agility. Electrifying their equipment, for example, while coming with high upfront costs, could be an effective strategy to reduce emissions.⁹⁴ Such reductions are projected to remain consistent to 2030, which could help reduce the technology's uncertainty.⁹⁵ With policy measures in place to bolster confidence, businesses can invest in renewable energy and contribute to a more sustainable and diversified energy mix.

Enhance competitiveness through border carbon adjustments

Canada should collaborate with like-minded countries to implement border carbon adjustments (BCAs). BCAs, whether in the form of import charges or export rebates, aim to serve several purposes: reduce carbon leakage, maintain the competitiveness of domestic industries, level the playing field between imported and exported goods, and encourage other countries to adopt stronger domestic climate policies.⁹⁶ The Government of Canada announced its intention to explore BCAs in 2020; this initiative needs to move forward.

The federal government should also engage in discussions with other trade partners, such as the United States and the European Union, to establish a shared understanding of the policies and costs to apply to BCAs.⁹⁷ Critically, this entails agreement on the relative emissions intensities of different goods and determining the scope of emissions, sectors, and product classifications covered.⁹⁸ By actively collaborating with other nations, Canada can ensure a coordinated and effective approach to implementing BCAs that encourages both competitiveness and decarbonization of its economic sectors.

An opportunity to supply critical minerals

Impact on Canada

The transition to clean energy is well underway as countries race to achieve their climate commitments, transforming the energy market and heightening competition to be global leaders. This environment is creating **skyrocketing demand for critical minerals**, which are essential for renewable energy technologies. Lithium, cobalt, and nickel are among those used in EV batteries, rare earth elements (REEs) are used in permanent magnets for wind turbines, and silicon is used in solar panels to generate electricity. The IEA estimates that reaching the Paris Agreement goals will require between four and six times more of these minerals than were used in 2020.⁹⁹

The **extraction, processing, and manufacturing of these minerals is geographically concentrated**. China dominates the market: it refines 85% to 90% of the world's REEs, 68% of cobalt, 65% of nickel, and 60% of lithium.¹⁰⁰ Seventy-five percent of all batteries and 57% of EVs are also produced there.¹⁰¹ Canada relies heavily on China to supply the minerals and related products that are fundamental for their energy transition, economic growth, and security. With the US-China trade war and open conflict in numerous parts of the world, the risk of

overreliance on any one country is painfully clear. Many countries are, therefore, looking to secure more resilient and diversified sources of critical minerals.

That's an opportunity we can't afford to waste: Canada holds abundant reserves of metals and minerals. While some critical minerals, such as nickel, aluminum, and uranium, are already produced here, there's plenty of potential to expand, which would reduce our reliance on international suppliers.¹⁰² There's also the potential to integrate throughout the entire value chain, rather than simply exporting mineral resources to be processed in foreign countries and reimported as final goods.¹⁰⁵ Indeed, **Canada could build a domestic ecosystem that encompasses all stages of the value chain and position itself as a responsible, sustainable mineral source for other countries.**

Taking advantage of this opportunity is not an easy feat. Projects in this sector are notoriously slow-going—Canada's Critical Minerals Strategy notes that it can take five to 25 years for a mine to become operational, with no revenue until production begins.¹⁰⁴ These high-risk projects require large upfront investments

and generate a slow return. Critically, they must also meet environmental and social standards, including meeting the Crown's obligation to consult Indigenous Peoples on conduct that might adversely impact Aboriginal or treaty rights. This requires building effective partnerships and proactively consulting Indigenous communities to be successful.¹⁰⁵ Canada needs to get these projects right, from the start, to **move faster on climate goals and enhance its competitiveness in the global market.**

Recommendations

Move faster and more responsibly

Canada needs to bring critical minerals to market sooner and in partnership with Indigenous Peoples. This starts with mining companies building trust-based relationships with Indigenous Nations even before initial project planning. These relationships should focus on profit-sharing, workforce development, community empowerment, and meaningful participation in decision-making. Taking these actions goes hand-in-hand with helping notoriously long projects move faster: only with the informed consent, leadership, and participation of Indigenous communities will mining projects be successful. Leveraging the wealth of Indigenous knowledge about environmental stewardship will also be enormously valuable to these projects.¹⁰⁶

For decades, private and public sector actors have aimed for “one project, one assessment,” to reduce duplication and increase efficiency in the approvals process.¹⁰⁷ Currently, businesses must meet a combination of federal and provincial or territorial assessments and approvals, along with Indigenous consultation and engagement, which often involves duplicated processes. In the 2024 federal budget, the government allocated \$9 million over three years to implement recommendations from the Ministerial Working Group on Regulatory Efficiency for Clean Growth Projects that would reduce interdepartmental inefficiencies and speed up permitting. These actions are essential and should be urgently carried out.¹⁰⁸

Responsible production of critical minerals also means ensuring the process doesn't emit more GHG emissions than those offset by the clean technologies they enable. Canadian mining companies should invest in technologies that lower emissions in processing and smelting. A recent example is the partnership between Rio Tinto and the federal government, which will invest up to \$737 million over eight years in the mining company to boost critical minerals production while cutting carbon emissions.¹⁰⁹

Compete throughout the value chain

In addition to supplying the world with critical minerals, Canada also should establish a strategic position throughout the global net-zero value chain, including the processing, advanced manufacturing, and recycling of these minerals. The government could introduce tax incentives to encourage processing in Canada. It could also expand critical mineral funding in the Strategic Innovation Fund to generate value, with an emphasis on helping companies carve out high-value opportunities that create economic value for Canada.¹¹⁰

Position Canada as a global leader in critical minerals

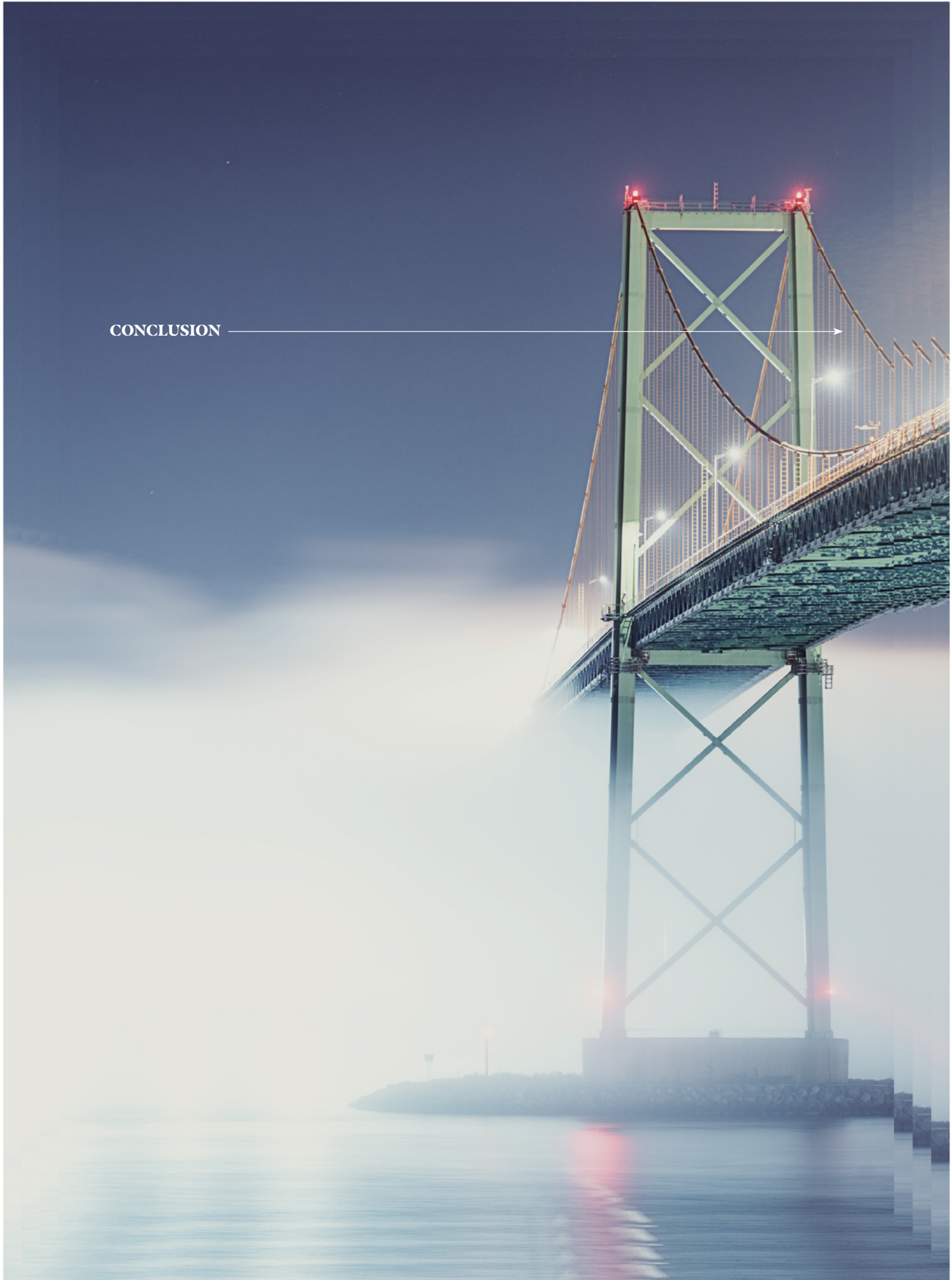
Canada has abundant natural resources and is a world leader in environment, social, and governance (ESG) standards, affording it a unique opportunity to position itself as a sustainable, responsible supplier of critical minerals to its allies amid geopolitical uncertainty. Not only would this increase its competitiveness and economic growth, but it would also allow the country and its allies to diversify their sources and reduce their dependence on high-risk imports.¹¹¹ Canada should continue to pursue and strengthen bilateral trade agreements with like-minded countries to position itself as a vital supplier of critical minerals.

In addition to enhancing domestic production, Canada should leverage international partnerships to improve mining practices in other countries. It should work with allies to set clear global standards for mining that is carbon-competitive, environmentally sustainable, and respectful of human rights. This includes setting extraterritorial pollution standards and delineating boundaries for unacceptable activities, such as human rights abuses. By defining and adhering to these standards, Canada can foster responsible practices and encourage the global supply chain to align with sustainability and ethical considerations.

Further, given the strategic importance of critical minerals to the future of the world's energy markets, Canada should champion the concept of treating them as a global commodity. This requires setting certain safeguards, such as transparency and security in data-sharing, the establishment of emergency stockpiles, and coordination of efforts among major users and suppliers.¹¹² Joint market oversight and management will be necessary to mitigate risks and ensure stability and sustainability. This is especially important for any projects in the Arctic, which is rich in critical minerals and also the locus of fierce geopolitical competition between Canada, China, Russia, the United States, and several other countries with competing claims. Encouraging cooperation and transparency in this region of strategic importance will be vital.



CONCLUSION



IT'S TIME FOR CANADA TO LEAD THROUGH THE DISRUPTIONS

→ We stand at one of the most significant crossroads for our country in decades. Each of the global disruptions explored in this report poses a host of complex challenges and opportunities; when considered together, the choices before us become even murkier. Yet, with that uncertainty comes immense potential—for businesses, for the economy, and for society.



With disruption now the norm rather than the exception, Canada's business and government leaders need a radical rethink of the choices at hand and the trade-offs they must make if they are to position our country as a global leader. This calls for bold, collaborative, and innovative action, and a commitment to building a future where our country, people, and businesses thrive, both at home and abroad.



We have everything we need to navigate these intersections, from a diverse talent pool to abundant natural resources to a world-leading AI ecosystem. Our leaders just need the courage and foresight to use these strengths to nudge Canada in the right direction—and to not only withstand but also flourish in any circumstance the future brings.

APPENDIX



Summary of the impacts of these intersections and our calls to action

INTERSECTION	IMPACT ON CANADA	RECOMMENDATIONS
AI REVOLUTION  TALENT TRANSFORMATION	<i>A battle to hire Canada's world-class AI talent</i>	<ul style="list-style-type: none"> ◆ Rethink strategies for attracting AI talent ◆ Work with universities to both access and develop AI talent ◆ Stem localized brain drain
	<i>A struggle to prepare workforces for AI-driven change</i>	<ul style="list-style-type: none"> ◆ Create an action plan to build workers' skills in AI ◆ Incentivize business investment in AI training for employees
GEOPOLITICAL UNCERTAINTY  AI REVOLUTION	<i>Harm from the global pursuit of AI sovereignty</i>	<ul style="list-style-type: none"> ◆ Position Canada as a leader in the global semiconductor industry ◆ Protect AI research from espionage
	<i>A need to catch up on AI governance</i>	<ul style="list-style-type: none"> ◆ Introduce AI governance and enhance agility
	<i>AI-enabled misinformation is undermining trust and democracy</i>	<ul style="list-style-type: none"> ◆ Fight the impact of misinformation on elections

INTERSECTION	IMPACT ON CANADA	RECOMMENDATIONS
<p>TALENT TRANSFORMATION  THE RACE TO NET-ZERO</p>	<p><i>Workers are unequipped to work in the net-zero economy</i></p> <hr/> <p><i>The benefits of net-zero opportunities are not evenly distributed</i></p>	<ul style="list-style-type: none"> ◆ Develop and implement a comprehensive net-zero skills strategy ◆ Attract talent to skilled trades careers <hr/> <ul style="list-style-type: none"> ◆ Create opportunities for equal access to high-quality clean energy jobs
<p>THE RACE TO NET-ZERO  GEOPOLITICAL UNCERTAINTY</p>	<p><i>Uncertainty about Canada's future energy mix is complicating efforts</i></p> <hr/> <p><i>An opportunity to supply critical minerals</i></p>	<ul style="list-style-type: none"> ◆ Support investments in clean technology and decarbonization ◆ Enhance competitiveness through border carbon adjustments <hr/> <ul style="list-style-type: none"> ◆ Move faster and more responsibly ◆ Compete throughout the value chain ◆ Position Canada as a global leader in critical minerals

Insights from Canada's business leaders

We held structured conversations with CEOs and directors from across Canada through a series of regional roundtables and our CEO | Director Symposium, which last year focused exclusively on the topic of this report. These conversations were organized around three questions that sought to gather insight on the impacts of global disruptions and the choices businesses and governments must make to have a neutral if not positive outcome. The following is a distillation of what we heard.

WHAT STRIKES YOU MOST ABOUT THESE DISRUPTIONS AND THEIR IMPACTS ON CANADA?

- ♦ ***The interconnectedness:*** Considering the intersectionality of these disruptions—and their ramifications for Canada—is crucial, but leaders struggle to think about their intersections, which poses challenges for handling them advantageously.
- ♦ ***The number of complexities to think about:*** Disruptions and economic measures should not be viewed in isolation. Factors like the lack of trust in institutions, changing demographics, quality of life, and income inequality must also be considered. And the era of misinformation and disinformation complicates reaching common understanding (agreed facts) on issues at a societal level.
- ♦ ***The need for collaboration and trust:*** Although they did so during the pandemic, businesses and governments are now struggling to work together for the common good. Cooperation and mutual trust are needed for Canada to take advantage of global opportunities, such as supplying critical minerals and attracting high-value talent from abroad.
- ♦ ***The fact the risks are imminent:*** Many of these disruptions pose significant near-term risks. For example, AI can amplify the damage caused by misinformation, cybersecurity attacks, and data privacy violations. Canada needs strong AI expertise and leadership to effectively regulate and mitigate these risks, while also aligning with other leading countries' regulations.

WHAT ACTIONS DO COMPANY LEADERS NEED TO TAKE TO NAVIGATE THESE DISRUPTIONS?

- ♦ **Commit to leadership:** Businesses need courage to take strategic risks, invest in people and technology, and help solve regional and national issues. Their leaders should, in collaboration with government, be proposing and advancing solutions to the opportunities and challenges posed by global disruptions.
- ♦ **Share the challenges:** No single organization can address the challenges alone, especially that of achieving the goal of net-zero emissions. Honest, consistent, science-based, and depoliticized approaches are necessary to create an environment for collaboration between the business community and governments.
- ♦ **Invest immediately in AI:** Without greater investment and action, Canada risks missing crucial AI opportunities for growth while other countries capitalize on them. AI must be deployed from coast to coast to coast now to drive the level of efficiency and productivity we need to be competitive on a global scale. Creating industry-specific task forces can address the pressing adoption challenges, while collaboration with government and educational institutions can develop specialized talent for the technology.

WHAT ACTIONS DO GOVERNMENT LEADERS NEED TO TAKE TO NAVIGATE THESE DISRUPTIONS?

- ♦ **Side with Team Canada:** Although Canada is recognized as a global player, too often we show up as individual companies or provinces—a disjointed group of interests rather than a powerful, unified voice. To effectively showcase Canada's potential, government and business leaders need to bring together diverse voices and create a cohesive chorus.
- ♦ **Connect the dots:** To navigate disruptions effectively, governments must acknowledge the interconnectedness of the four disruptions and make the connections between them. For example, while immigration is a competitive advantage for this country, policymakers must ensure that newcomers are welcomed with adequate infrastructure to support them, which will require significant new investment in social and economic infrastructure: health care, education, housing, and credentials recognition, among others. A prosperous future depends on connecting the dots between these disruptions.

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