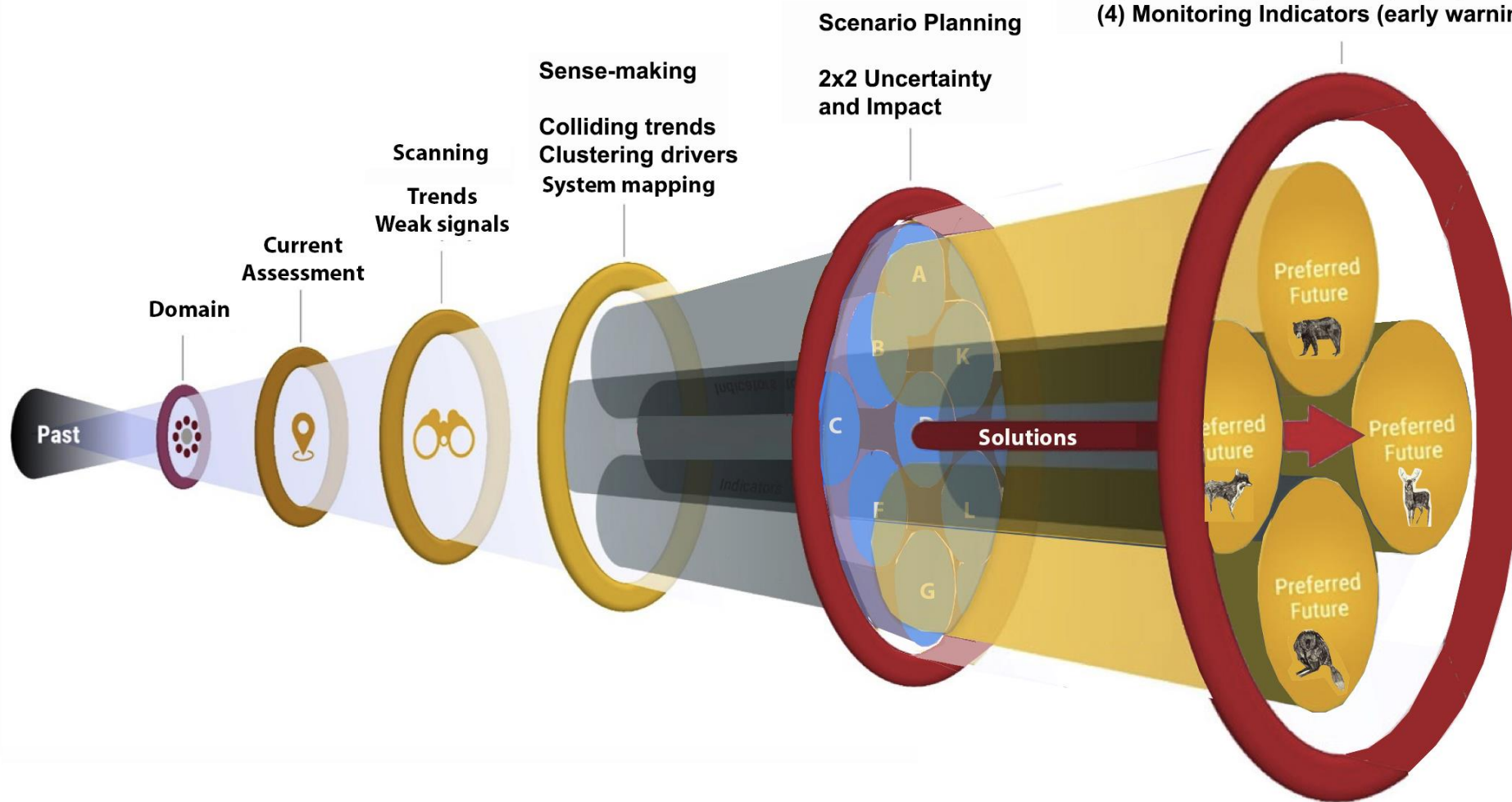




Horizons 2060

50 Trend Cards

September 7, 2022



Developing Alternative Scenarios of the Future

- (1) Windtunneling (stress-testing policies, programs & initiatives)
- (2) Backcasting (developing actions)
- (3) Three-Horizons (identifying system-level adjustments)
- (4) Monitoring Indicators (early warning system)

50 trends that may impact the living standards of Nova Scotians

Built Capital

- B.10 - Decline in affordable housing
- B.11 - Reliable Internet access is increasingly necessary for work
- B.12 - Lower infrastructure spending than the national average
- B.20 - Robotics has been changing the level of skills in the workforce
- B.32 - Low levels of business Investment
- B.31 - Increased Artificial Intelligence (AI) across the economy
- B.32 - More investment in robots, drones and autonomous vehicles
- B.33 - Increasing investment in cybersecurity and trust architecture
- B.34 - Growth in the Internet of Things (IoT)
- B.35 - Investment in quantum computing is growing
- B.36 - Growing interest in the Metaverse and immersive realities (IR) technologies
- B.37 - Quality of trade infrastructure in Canada is declining
- B.40 - Trade in services has been growing, enabled by digitization
- B.41 - A shift to green infrastructure
- B.42 - Shipbuilding is growing

Human Capital

- H.10 - Nova Scotia's population is aging
- H.11 - Increase in net interprovincial migration
- H.12 - International students have become an important source of labour supply
- H.13 - Temporary Foreign Workers are a rising percentage of the workforce
- H.20 - Job polarization is shifting skills demand in Canada
- H.21 - Pension income is becoming more important
- H.22 - The skills mismatch is widening among youth
- H.23 - Workplace values are changing with new generations
- H.24 - Fewer work transitions
- H.25 - The digital literacy and skills needed for work are evolving exponentially
- H.30 - Rising concerns over talent scarcity
- H.31 - A shift towards hybrid and remote work
- H.32 - Job growth has been concentrated in services

Social Capital

- S.10 - An increase in immigration to Nova Scotia
- S.20 - People are living longer, healthier lives
- S.21 - Higher unemployment rates persist among some groups
- S.22 - Mental health and absenteeism
- S.30 - Income inequality is rising globally
- S.31 - Trust in institutions has been declining
- S.32 - Changes in female labour force participation and family caregiving
- S.33 - Diversity, Equity and Inclusion workplace strategies are evolving
- S.34 - Rising business uncertainty
- S.40 - Increasing trade protectionism

Natural Capital

- N.10 - Migration due to climate change is on the rise
- N.20 - Increasing demand for sustainable forestry
- N.21 - Warming oceans are impacting Atlantic fisheries
- N.22 - Agriculture faces climate-related challenges and opportunities
- N.23 - Climate change is impacting labour productivity
- N.30 - Increasing trend of drought occurrence
- N.31 - More interest in circular economy strategies
- N.32 - Clean technologies are fueling growing demand for critical minerals
- N.40 - Increasing opportunities in the oceans economy
- N.41 - Nova Scotia is transitioning to more renewable energy
- N.42 - Growth in the hydrogen economy
- N.43 - More opportunities in the bio-economy

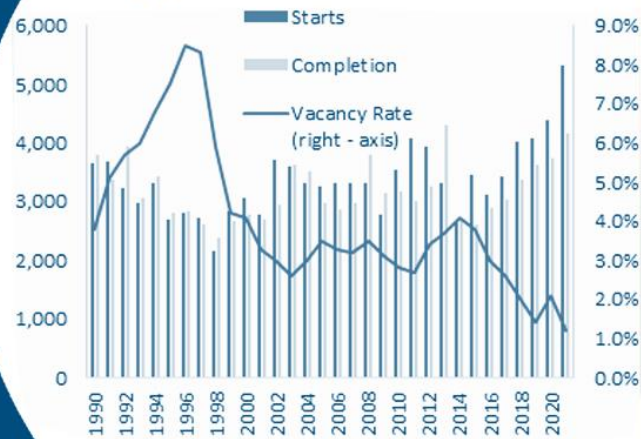
Decline in Affordable Housing

B.10

Nova Scotia's housing market is pressured by a growing population. Despite a recent increase in housing starts and completions, housing stock is not increasing with the pace of population growth.

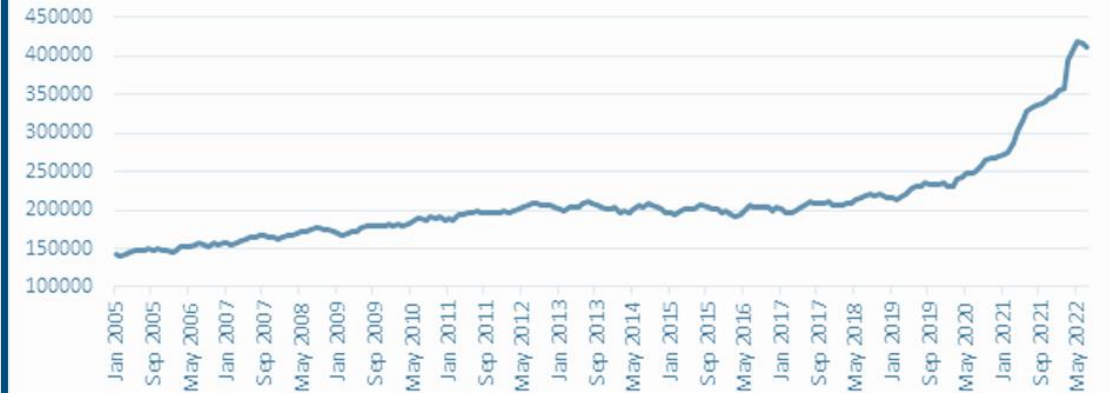
Vacancy rates have been trending downwards to 1.2% in Nova Scotia (including a 1.0% vacancy rate in Halifax).

Housing in Nova Scotia's Communities with a population of 10,000 and over



The gap between incomes and market rent is also growing, creating a severe affordability problem.

House Sale Price, Nova Scotia, 2015-2021



Sources: CMHC Rental Market Survey 2021; Canadian Real Estate Association (CREA)

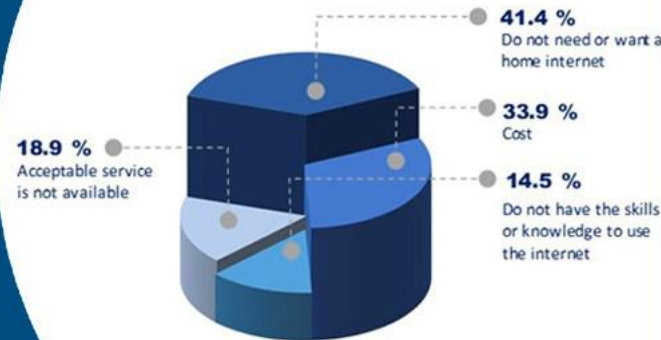
Reliable Internet access is increasingly necessary for work

B.11

Rural areas with good internet access can attract and retain more new residents than areas without.

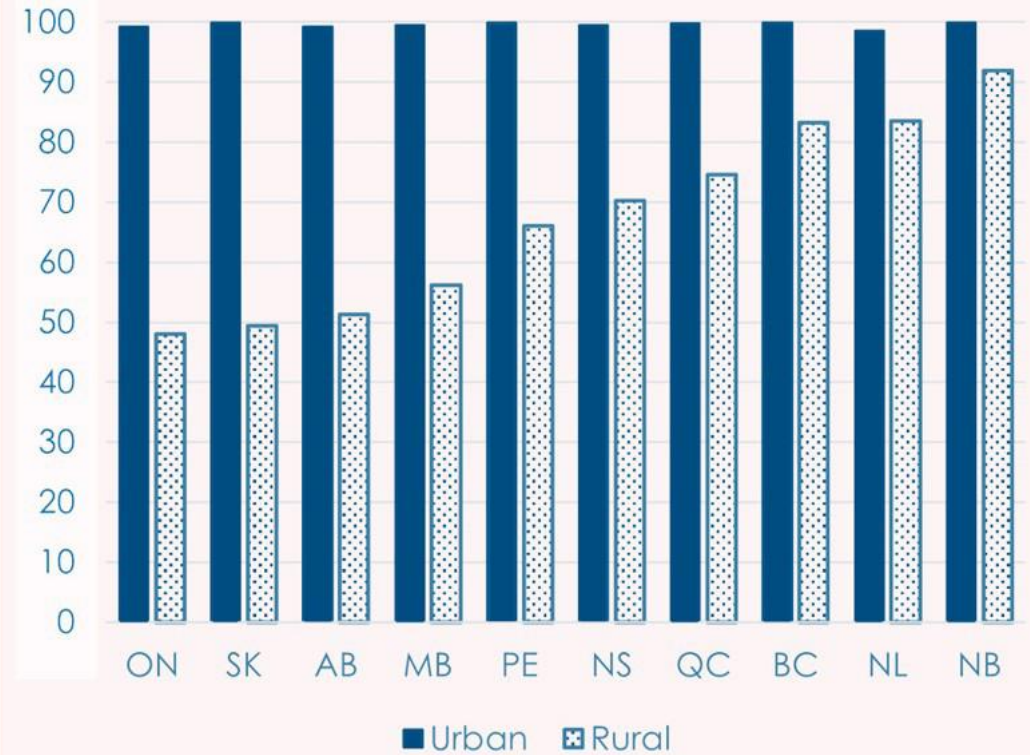
Communities will also need to keep up with advancements in communications infrastructure. 5G, a new generation of broadband cellular networks, could add \$13.2 trillion to the global economy by 2035.

Reasons Rural Canadians do not use the Internet, 2018



Broadband Coverage (2020)

(Percentage of households with access to download speeds of at least 50 megabits per second (Mbps) and upload speeds of at least 10 Mbps, with an unlimited data option)



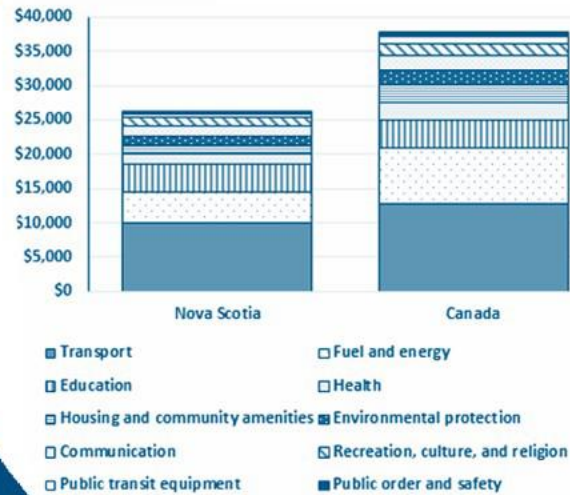
Sources: Canadian Radio-television and Telecommunications Commission (CRTC); PricewaterhouseCoopers (PwC)

Lower infrastructure spending than the national average

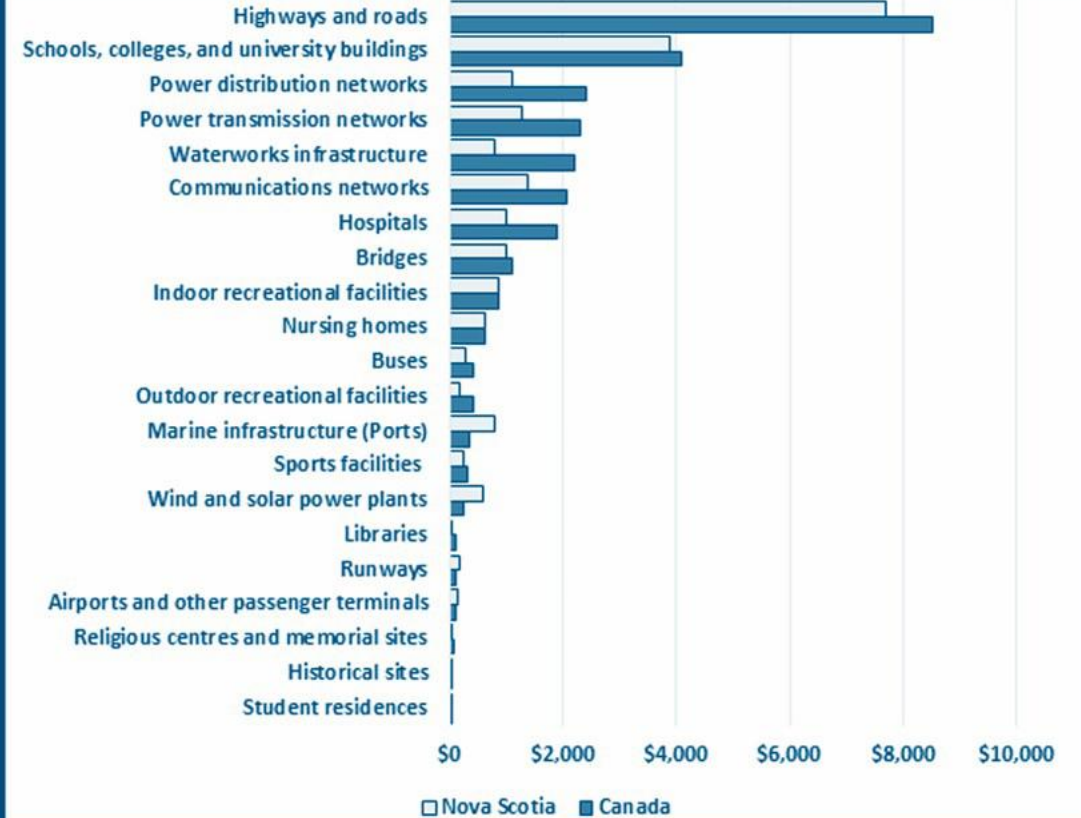
B.12

Modern infrastructure is important for economic development, including attracting and retaining people. Between 2000 and 2020, Nova Scotia had lower investment per capita in most major categories of infrastructure.

Investment in Infrastructure per capita, 2000-2020



Infrastructure Investment per capita, by asset, 2000-2020



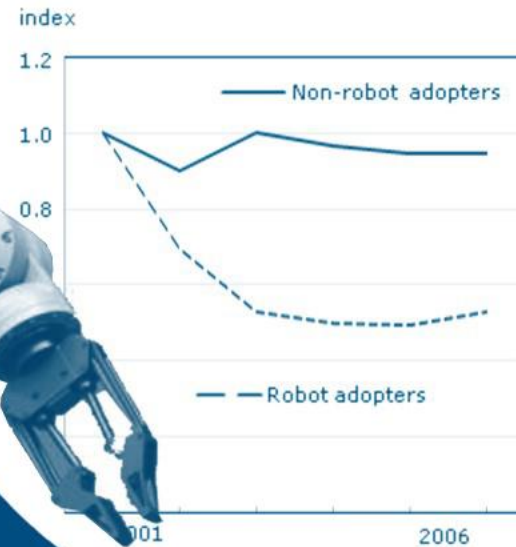
Sources: Statistics Canada, Tables: 36-10-0608-01 and 17-10-0005-01

Robotics has been changing the level of skills in the workforce

B.20

Firms are adopting robots to increase productivity. This does not involve overall job losses, but changes in occupations.

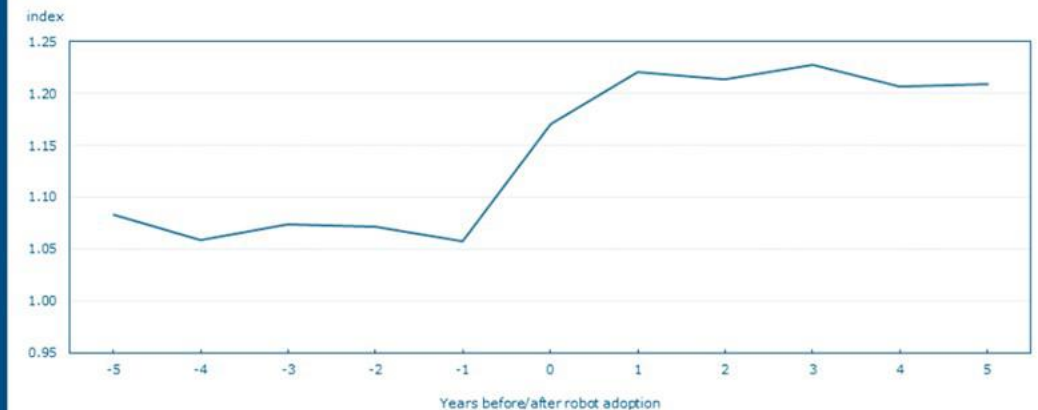
Number of managers by type of firm



A study by Statistics Canada shows investment in robotics increases total employment but decreases the number of managers. It also leads to a decrease in middle-skilled workers and an increase in employment of high-skilled workers.

Currently, the higher the education and skill level, the lower the risk of employment loss due to automation.

Change in employees (indexed to firm's first year in sample)

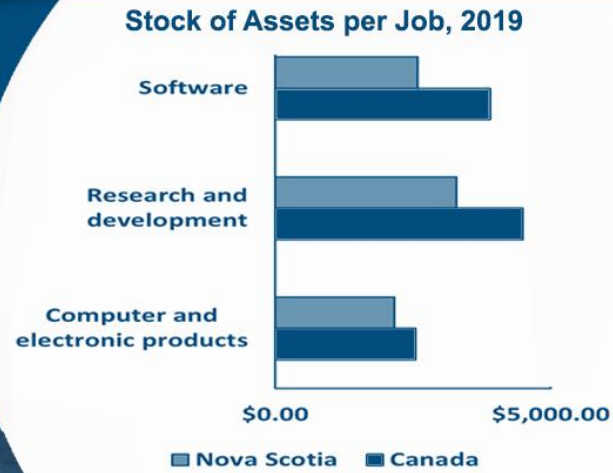


Source: Dixon, Jay (2020) "The employment consequences of robots : firm-level evidence" Ottawa. Statistics Canada. Analytical Studies Branch research paper series, 1205-9153 ; no. 454

Low levels of business Investment

B.30

Investment in physical capital such as machinery and equipment, including information and communication technology (ICT), is a key productivity driver.



Between 2000 and 2020, Nova Scotia had the lowest non-residential business investment in Canada that includes non-residential buildings, engineering construction, machinery and equipment (including ICT), and intellectual property products.

Business Non-Residential Investment Growth by Province, 2000-2020

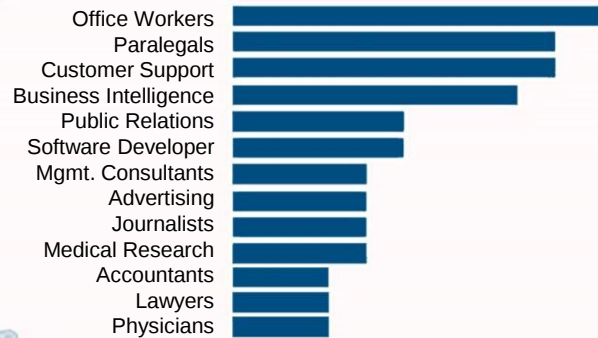


Sources: Statistics Canada, Tables: 36-10-0222-01; 36-10-0480-0; and 36-10-0098-01; Centre for the Study of Living Standards (2012) A Detailed Analysis of Nova Scotia's Productivity Performance

Increasing use of Artificial Intelligence (AI) across the economy

B.31

AI's forecasted impact on productivity between 2022–2030



Artificial Intelligence (AI) can be generally defined as the ability for a machine to perform cognitive functions as well as or better than humans.

AI is increasingly used across most industries. It solves business problems, detects fraud, improves crop yields, manages supply chains, and a multitude of other business processes.

For the last several years, demand for AI talent has outpaced supply. In the U.S., there were nearly three times more AI-related job postings on Indeed last year than job views for AI-related roles. As demand grows, the hiring process is taking longer and becoming more expensive. This is impeding growth at some companies.

During the next decade, AI is predicted to reshape the knowledge economy, automating some tasks currently performed by people and augmenting others.

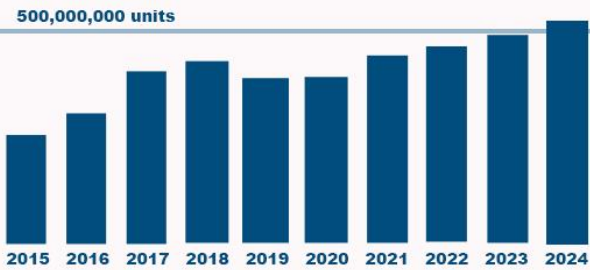
Source(s): Ffuture Today Institute; "Occupational Employment and Wage Statistics," U.S. Bureau of Labor Statistics; "The Impact of Artificial Intelligence on Labor Productivity," Eurasian Business Review; "Economic Impacts of Artificial Intelligence (AI)," European Parliament; "A Future That Works: Automation, Employment, and Productivity," McKinsey Global Institute; Reuters Institute, Oxford University.

More investment in robots, drones and autonomous vehicles

B.32

A robot is an autonomous machine capable of sensing its environment, carrying out computations to make decisions, and performing actions in the real world. Progress in robotics may help make life easier, richer and healthier.

Annual installations of Industrial Robots



The adoption of robots is already contributing to improved productivity, at the level of individual business processes, firms, industries and the economy overall.

Current and Emerging Applications span the Economy

Industrial robots first appeared in the 1960s, in the automotive sector. They were large, expensive, static and performed one or a small number of repetitive tasks. New generations are smaller, cheaper, more mobile, autonomous, flexible and co-operative. Many can be programmed and used by non-specialists. Some can even imitate human counterparts.



Agricultural robots have a particular importance in OECD countries because of the declining share of young people in the population, and the physical demands of some agricultural tasks, especially in harvesting. In one among many recent breakthroughs, researchers at the University of Cambridge developed an AI-driven robot that can identify and harvest lettuce.

Robots have a growing range of roles in services. For example, they can fly, tunnel, swim and crawl to facilitate rescue. A robot snake is credited with saving lives in the search for victims after the Mexico earthquake in 2017. Robots are also beginning to be used in construction, sifting waste, sophisticated logistics, and even in education, a process accelerated by advances in the science of learning.

Exploration of the remote and hostile environments of space and the oceans has also spurred innovation in robotics. Among other uses, robots in marine science are aiding the environment. An example is a robot crab, designed by Italian researchers, that clears the seabed of plastics.



Industry

Agriculture

Services

Space and oceans

Source: Nolan, A. (2021), "Making life richer, easier and healthier: Robots, their future and the roles for public policy", OECD Science, Technology and Industry Policy Papers, No. 117, OECD Publishing, Paris

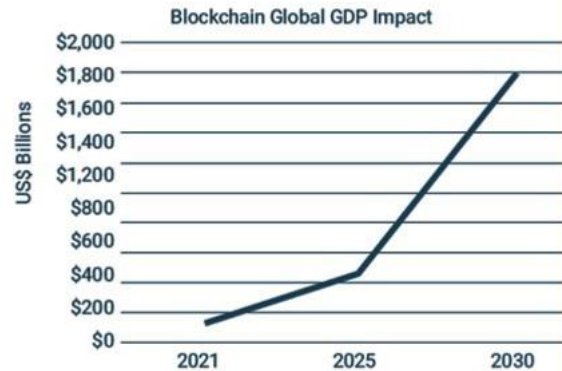
Increasing investment in cybersecurity and trust architecture

B.33

Cyber attacks are on the rise, and market indicators reflect a fear of future increases. This has driven new types of cybersecurity.

Zero-trust architecture (ZTA) is a type of IT system design which assumes that all entities, both within and outside of an organization, cannot be trusted and therefore applies cybersecurity controls to every interaction.

Anticipated Growth in Blockchain Contributions to GDP



Digital identity consists of all the digital information that characterizes and distinguishes an individual or an entity. It enables the creation of a “single source of truth” for personal information and more effective coordination across service providers.

Blockchain, and other distributed ledger technologies, offer an alternative way of securing data and transaction records for use by multiple parties and creating massive efficiencies.

Future outlook of cybersecurity market



\$101.5

billion in projected spending on service providers' by 2025



15%

annual increase of costs related to cybercrime; will reach **\$10.5 trillion** a year in 2025



85%

of small and midsize enterprises intend to increase IT security spending until 2023



3.5

million cybersecurity positions now open worldwide



+21%

forecast of compound annual growth for direct cyber insurance premiums until 2025

Source: OECD Digital Economy Outlook 2020; McKinsey Technology Trends Outlook 2022

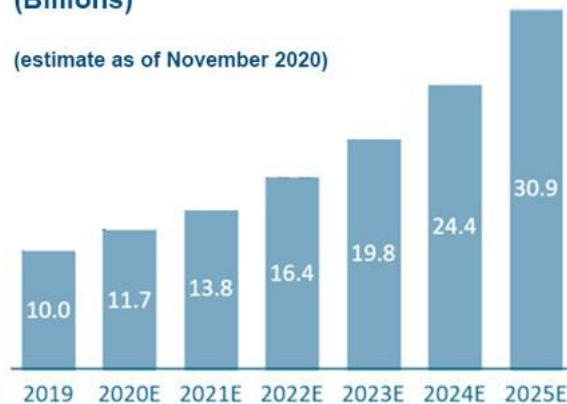
Growth in the Internet of Things (IoT)

B.34

The Internet of things (IoT) describes physical objects with sensors, processing ability, software, and other technologies that are increasingly connecting and exchanging data with other devices.

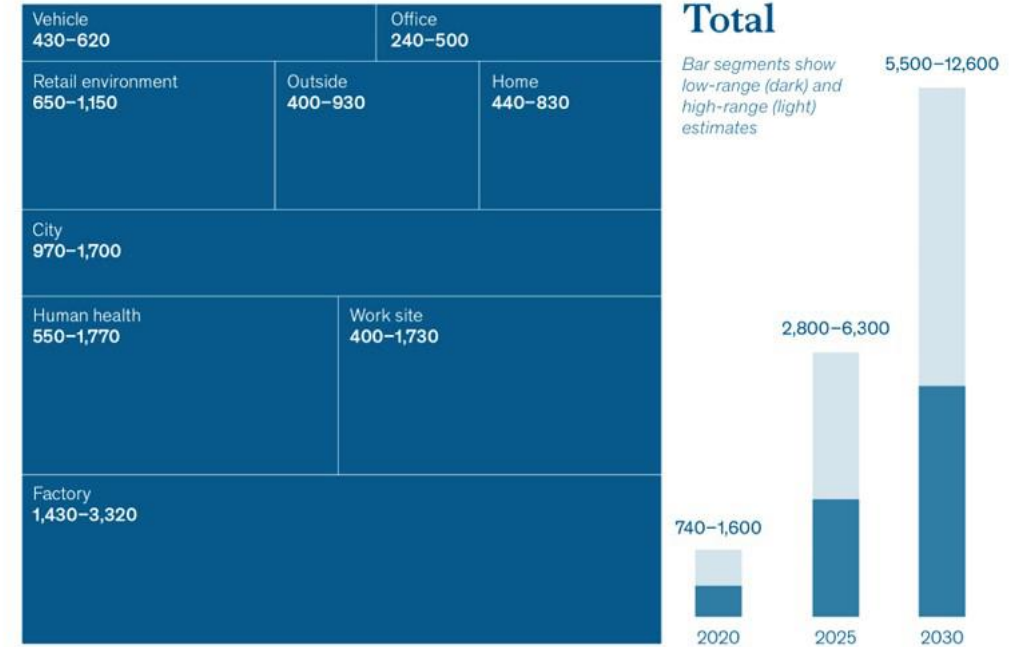
Number of Global IoT connections (Billions)

(estimate as of November 2020)



It is estimated that by 2030, the IoT could enable \$5.5 trillion to \$12.6 trillion in value globally.

Estimated 2030 economic value of Internet of Things adoption, by setting, \$ billion



Source: McKinsey "The Internet of Things: Catching up to an accelerating opportunity" – November 2021; IoT Analytics Research

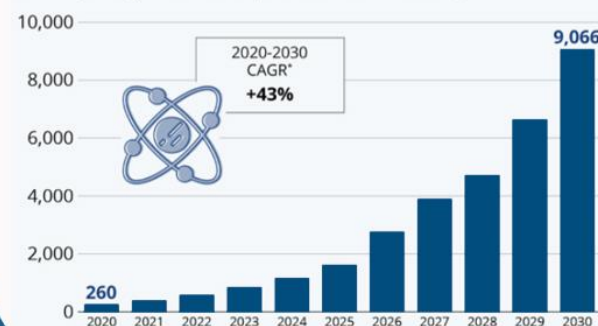
B.35

Investment in quantum computing is growing

The development of quantum computers – able to perform any computational task allowed by the laws of physics – could have a substantial benefits across multiple industries.

Quantum Leap for Quantum Computing

Projected worldwide market size of quantum computing 2020-2030 (in million U.S. dollars)

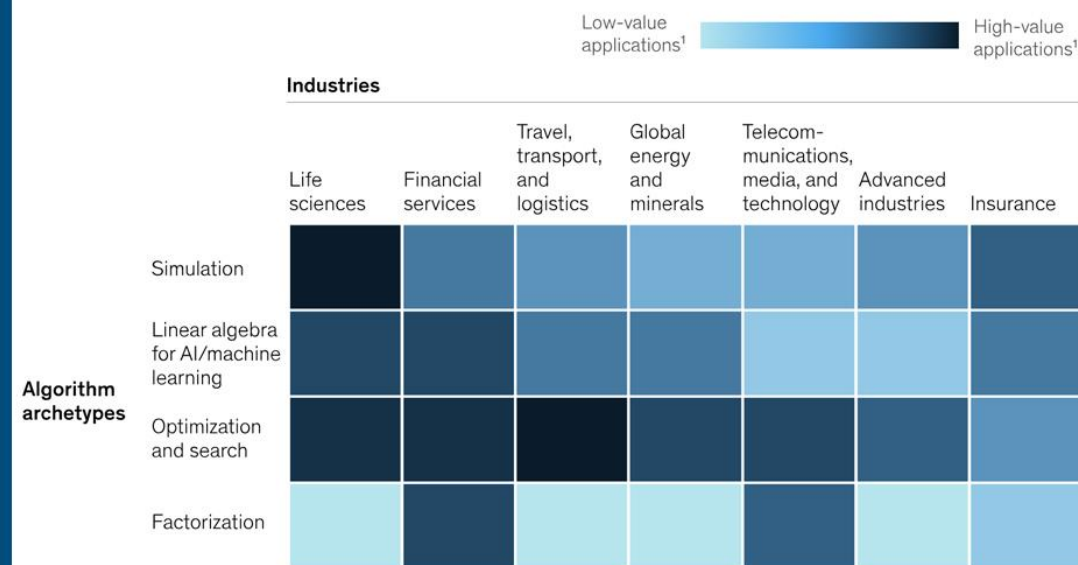


* Compound (average annual) growth rate

Source: Statista Digital Economy Compass 2021

A report by the Boston Consulting Group predicts productivity gains by end-users of quantum computing to surpass \$450 billion annually, reaching \$850 billion in 2050. These predicted gains include both cost savings and revenue opportunities

Qualitative estimate of expected value unlocked by the application of quantum computing by 2030



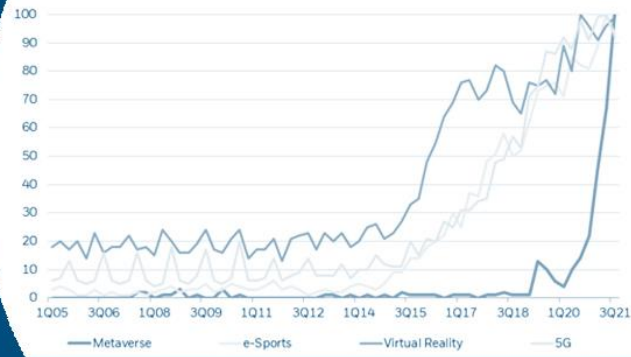
Source: OECD Digital Economy Outlook 2020; McKinsey, 2022

Growing interest in the Metaverse and immersive reality (IR) technologies

B.36

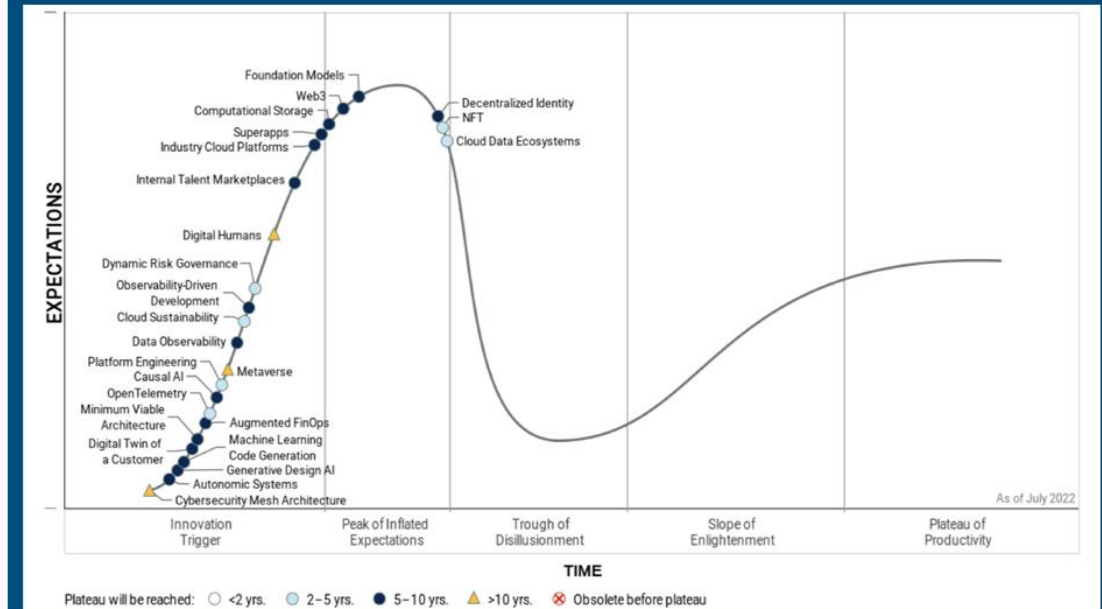
The metaverse is an immersive, interactive environment generated by a computer. However, there is no unified agreement on what the future of the metaverse will look like or how individuals will interact with it.

Metaverse mentions in global company transcripts



The metaverse can be envisioned as an interoperable platform blurring digital and physical worlds by bringing together existing and new immersive technologies such as augmented reality (AR) - enabling partial immersion in real-world settings, and virtual reality (VR) - immersing users in entirely virtual settings.

Hype Cycle for Emerging Technologies, 2022



Source: Gartner, Hype Cycle for Emerging Technologies 2022; Global Data; Fortune Business Insights; McKinsey Technology Trends Outlook 2022

Quality of trade infrastructure in Canada is declining

B.37

Infrastructure (such as roads, airports, ports, and railroads) facilitates the movement of goods within a country and across borders.



Nova Scotia relies on Canada's trade infrastructure to get its goods and services to market. Canada comparatively depends more on trade for its economic growth than other countries.

Several sources show Canada is falling behind other countries on the overall quality of infrastructure. As other countries increase investment in trade infrastructure, such as ports, airports, road, and rail, Canada risks losing competitiveness to other networks and missing out on global opportunities.

On the other hand, there have been significant investments in Nova Scotia's transportation network, including additional capacity at the Halifax Stanfield International Airport and Port of Halifax.

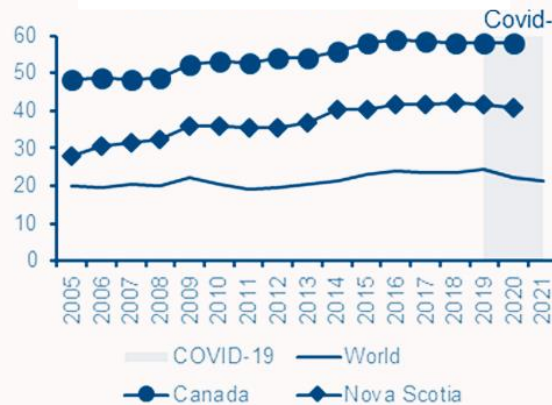
Sources: World Economic Forum Global Competitiveness Index; Western Transportation Advisory Council; and European Court of Auditors

Trade in services has been growing, enabled by digitization

B.40

Trade in services refers to the sale and delivery of intangible products, called services, between producers and consumers.

Percent Trade in Services



Globally, the importance of trade in services continues to grow. This trend has been even more profound in Canada and Nova Scotia.

Many traditional goods exports are becoming digital (books, magazines, games, movies, television, etc.)

In addition, 3D printing allows some manufactured goods to be traded without the physical product having to cross borders. Goods that have been sold in this way include medical supplies, pharmaceuticals, furniture parts, ceramics, glassware, iron and steel parts, copper piping, and tools.

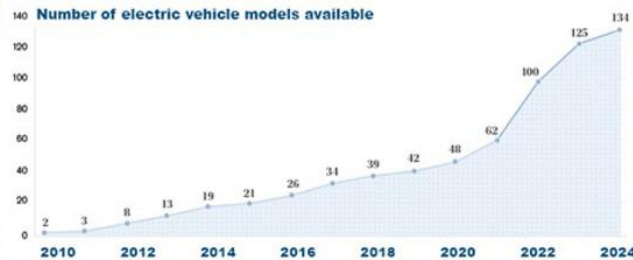
Sources: WTO Statistics; Statistics Canada, GDP Expenditure Based

A shift to green infrastructure

B.41

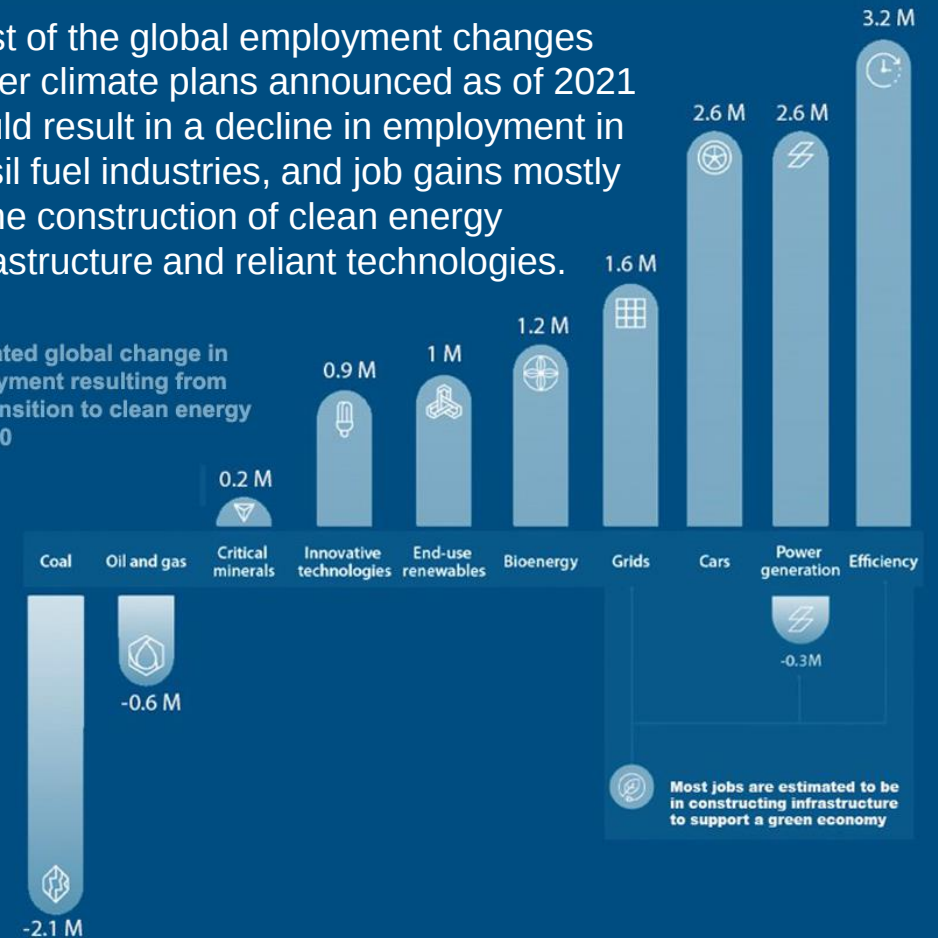
Worsening climate crisis situations and stronger public pressure has accelerated momentum towards addressing climate change and transitioning to a clean and sustainable economy. There is now greater risk associated with inaction for societies, organizations, and individuals.

Number of EV Models will double by 2024



Most of the global employment changes under climate plans announced as of 2021 would result in a decline in employment in fossil fuel industries, and job gains mostly in the construction of clean energy infrastructure and reliant technologies.

Estimated global change in employment resulting from the transition to clean energy by 2030



Source: IEA, World Energy Outlook

Shipbuilding is growing

B.42

Canada's next generation of combat vessels are being built in Nova Scotia - a contract valued at \$70 billion.

Halifax Shipyard contributed 10% of Nova Scotia's Economic Growth in 2019

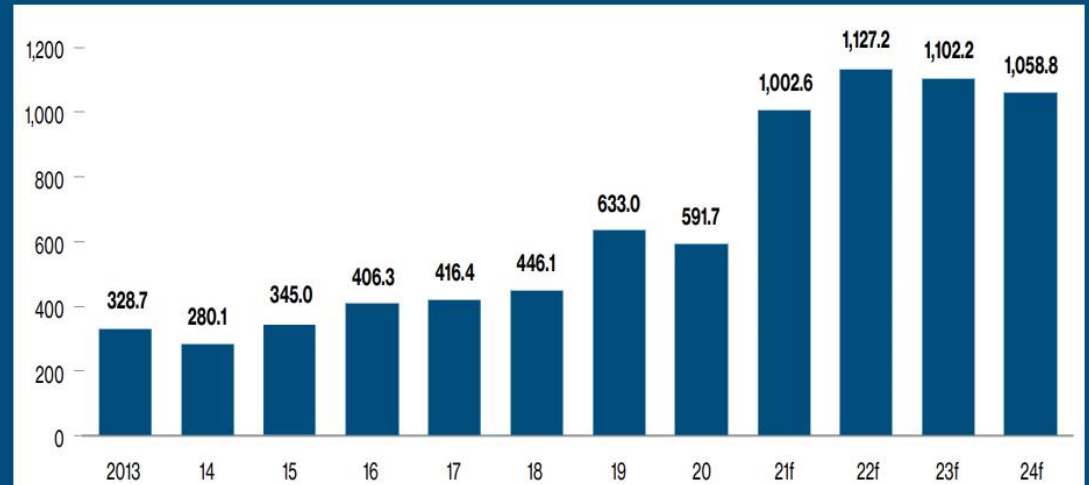


Percentage point contribution to real GDP growth



Between 2009 and 2019, productivity in Nova Scotia's shipbuilding industry has almost tripled. As of 2022, the shipbuilding project has created thousands of Canadian jobs and billions in GDP. The project's expansion means more long-term jobs.

Spending expected to ramp up in 2025 as the Canadian Surface Combatants Program progresses
(spending at Halifax Shipyard, \$ millions)



Sources: Halifax Shipyard; The Conference Board of Canada; Canadian House of Commons; Statistics Canada, Tables: 36-10-0480-01; 36-10-0402-02

Nova Scotia's population is aging

H.10

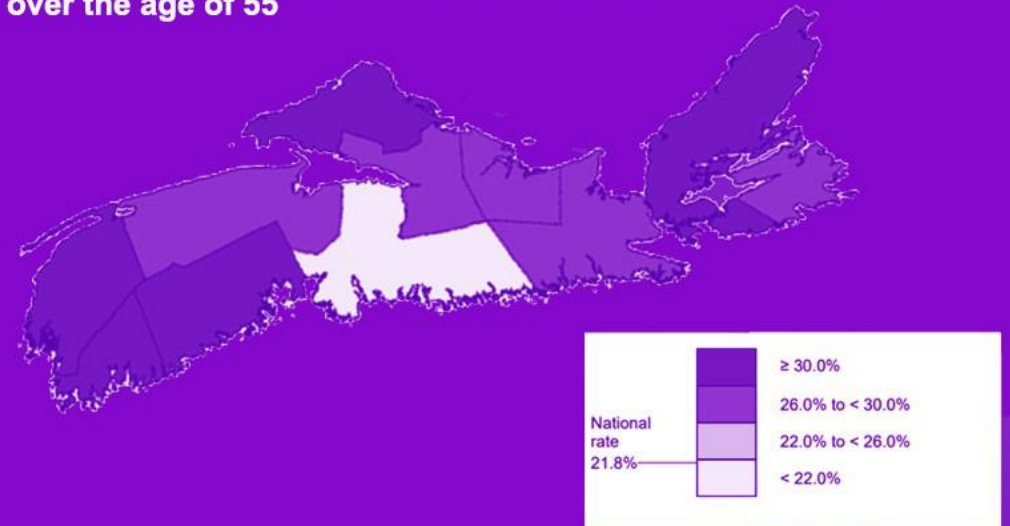
Between 2001 and 2021, the proportion of Nova Scotia's population over 65 years of age has grown from 13.9% to 22.2%.

Nova Scotia Population by Age



Rural areas of Nova Scotia have relatively older populations. In some regions of Nova Scotia, over one third of the population between the ages of 15 to 64 is 55 or older.

Percentage of the working-age population (15 to 64) over the age of 55



Source: Statistics Canada, 2021 Census of the Population

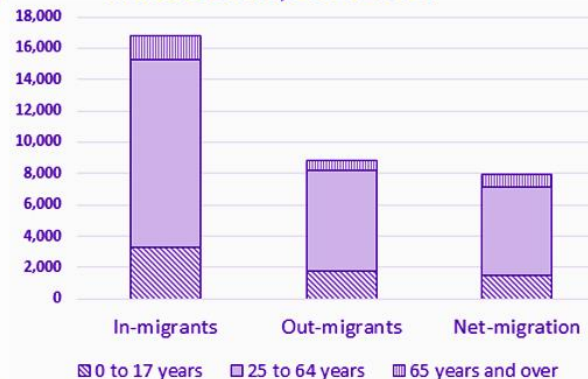
Increase in net interprovincial migration

H.11

Nova Scotia has set a target of reaching 2 million in population by 2060. Along with immigration, this will require positive net interprovincial migration.

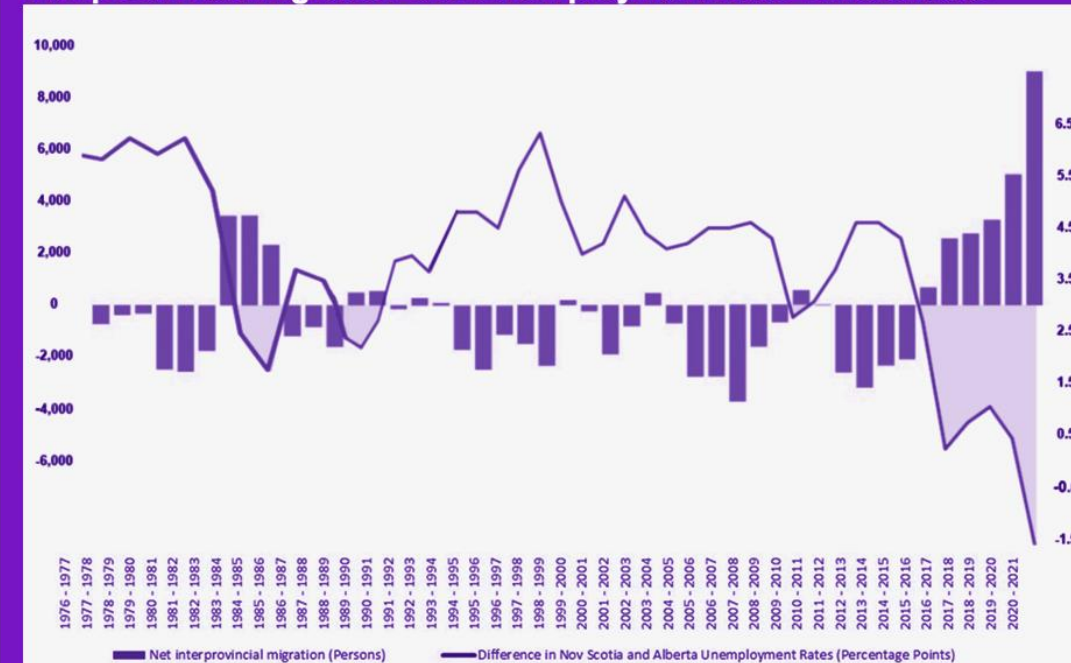
The province has had an upswing in positive net interprovincial migration due to both more people moving to or back to Nova Scotia and less moving away.

Net interprovincial migration
Nova Scotia, 2020-2021



Historically, interprovincial migration has been driven primarily by differences in employment opportunities among provinces.

Interprovincial Migration and Unemployment Rate Differentials

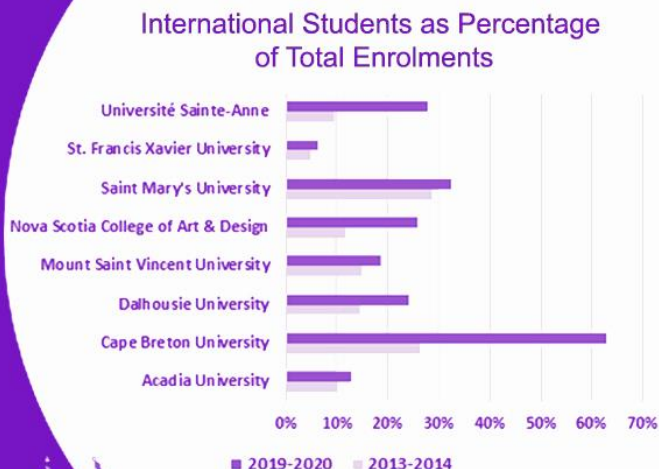


Source: Statistics Canada, Table: 17-10-0005-01; Table: 17-10-0015-01; and Table: 14-10-0287-03

International students have become an important source of labour supply

H.12

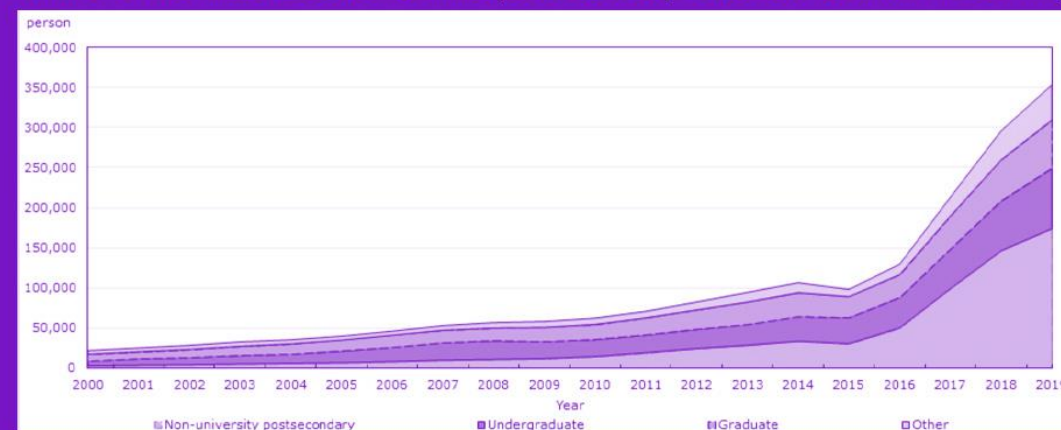
There is both an increasing number of international students and a rise in their labour force participation rates.



Between 2000 and 2019, the number of international students with T4 earnings in Canada increased from 22,000 to 354,000.

One-third of international students who arrived in the late 2000s and early 2010s became permanent residents within 10 years of being in Canada.

Number of international students at the postsecondary education level with T4 earnings



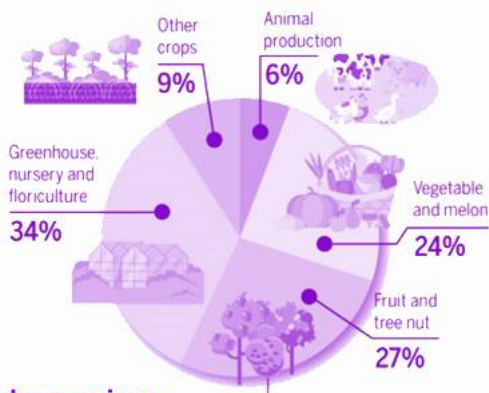
Source(s): Crossman et al. (2022). International students as a source of labour supply: Engagement in the labour market during the period of study; Maritime Provinces Higher Education Commission (MPHEC)

Temporary Foreign Workers are a rising percentage of the workforce

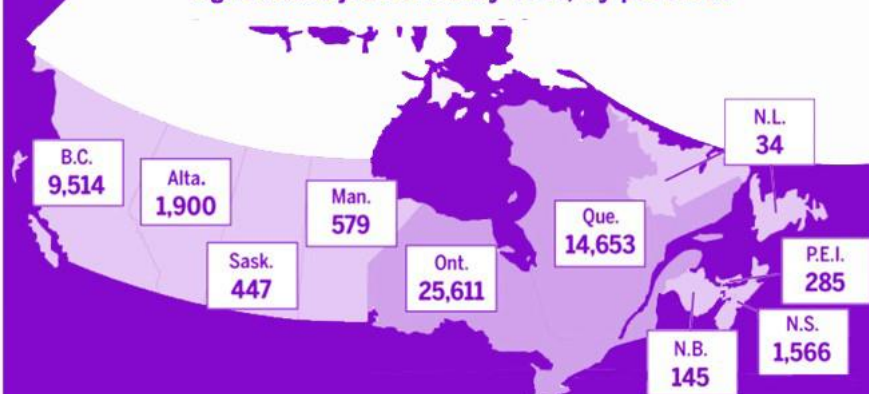
H.13

In 2019, temporary foreign workers (TFWs) accounted for 4.1% of the total T4 earners in Canada, a large increase from 1.9% in 2010.

Jobs filled by TFW in Canada's Agriculture Sector, 2018

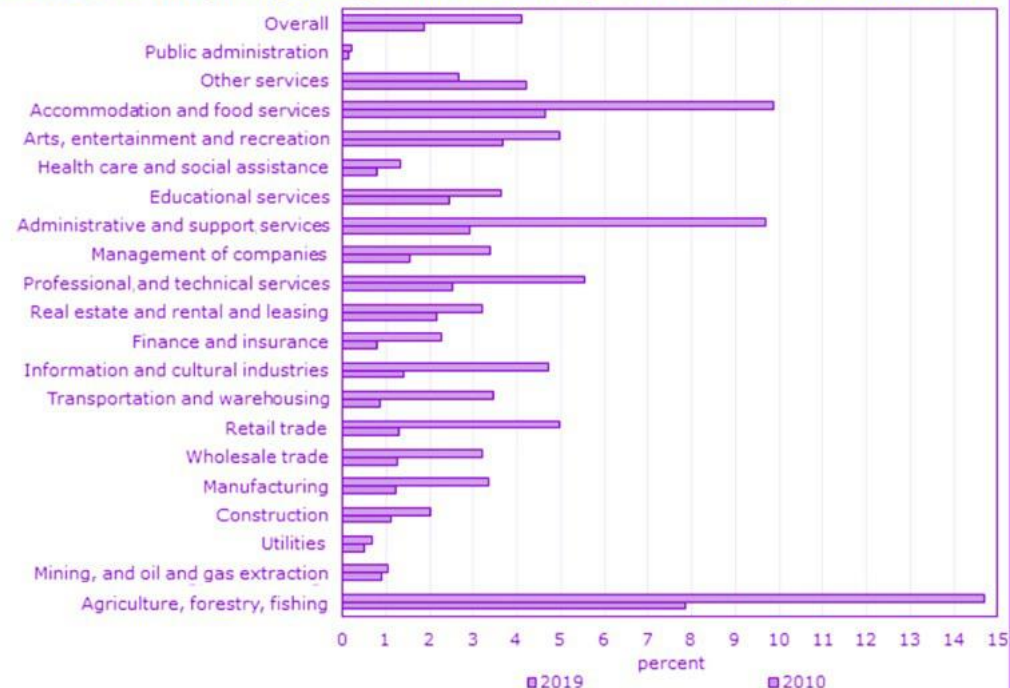


Agriculture jobs filled by TFW, by province



The reliance on TFWs is particularly high in several sectors – including agriculture, accommodation and food services, administrative and support services.

The share of temporary foreign workers among all T4 earners, 2010 and 2019



Source: Lu & Hou (2019). Temporary foreign workers in the Canadian labour force: Open versus employer-specific work permits.

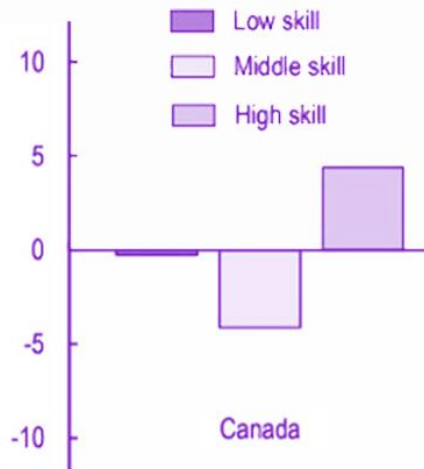
Job polarization is shifting skills demand in Canada

H.20

Labour markets across Canada have become more polarized over the last decades, with declines in the share of employment in middle-skill jobs.

Between 2011 and 2018, the share of middle-skill jobs has decreased in all of Canada's provinces, while there has been a clear shift towards high-skill jobs. The share of low-skill jobs has also decreased.

Percentage Point Change in Employment 1998-2018

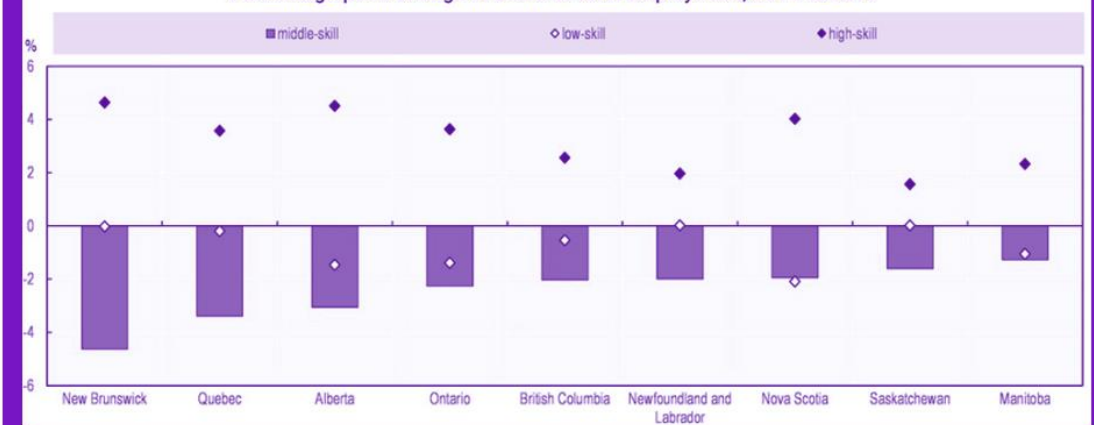


Low-skill jobs include service workers, shop and market sales workers and elementary occupations.

Middle-skill jobs include clerks, craft and related trades workers and machine operators and assemblers.

High-skill jobs include professionals, manager and technicians.

Percentage point change in share of total employment, 2011 to 2018



Source: OECD. (2017). OECD Employment Outlook

Pension income is becoming more important

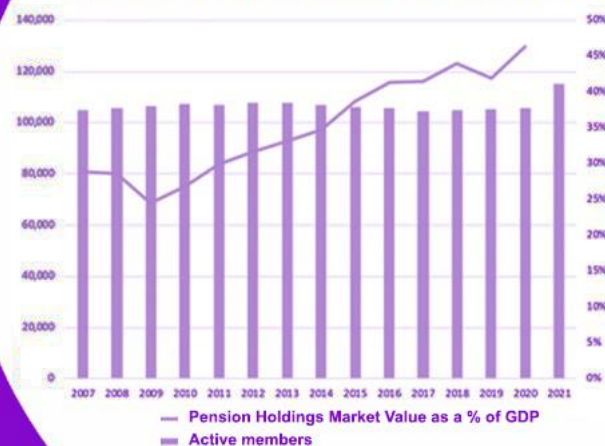
H.21

Nova Scotia's aging population has resulted in more retirements.

The value of pension assets in Nova Scotia expressed as a percentage of GDP has ballooned from 25% in 2009 to 46% in 2020.

The impact of pension income is very large in some communities. For instance, between 2010 and 2019, the percentage of income in Annapolis Royal derived from pensions grew from 34% to 40%.

Registered Pension Plan Members in Nova Scotia



Canadians mostly contribute to personal RRSPs, with a declining emphasis on employer-led pension plans. The percentage of Canadian private sector employees covered by a registered pension plan declined from 28.2% in 2000 to 24.1% in 2020.

As women's median RRSP contributions are historically lower than men's, this issue also has a significant gender impact.

Did we see an increase resignations in Nova Scotia?

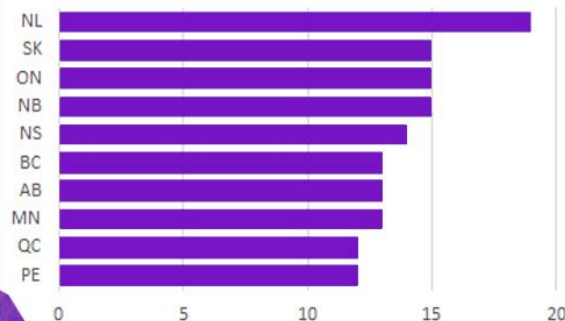


Source(s): Statistics Canada, Tables 11-10-0133-01, 14-10-0027-01; 36-10-0222-01; 11-10-0094-01; LSI Calculations

The skills mismatch is widening among youth

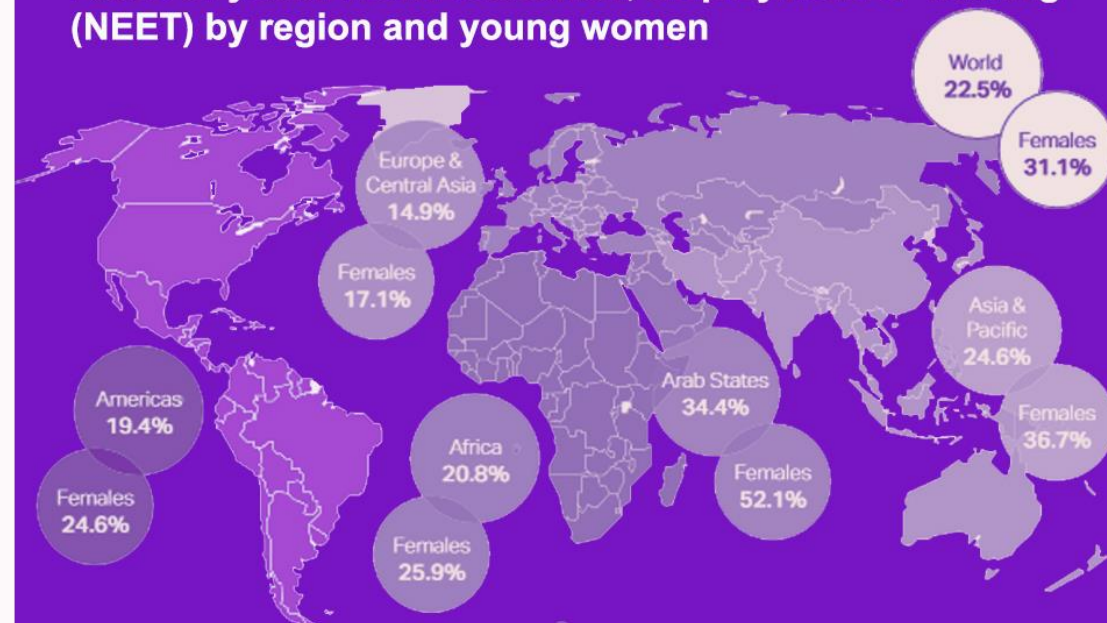
The mismatch between the skills that young people acquire on their learning journeys and the skills required to find and succeed in work is widening and affects people across the globe.

Percentage of youth (15 to 29 years) not in employed, education or training (NEET)



The uneven distribution of digitally driven employment and wage losses could lead to greater inequality. More young people feeling disenfranchised and disillusioned about their employment prospects could fuel social unrest, create a more volatile business environment and stunt economic growth.

Rates of youth not in education, employment or training (NEET) by region and young women



Sources: Global Employment Trends for Youth 2020: Technology and the future of jobs International Labour Office – Geneva: ILO, 2020; Statistics Canada, Table: 37-10-0196-01

Workplace values are changing with new generations

H.23

There are currently four generations co-existing at work – Boomers, Generation X, Millennials (GenY) and Gen Z.

Organizational culture is playing catch up to significant tensions and shifts in the values and aspirations of employees.

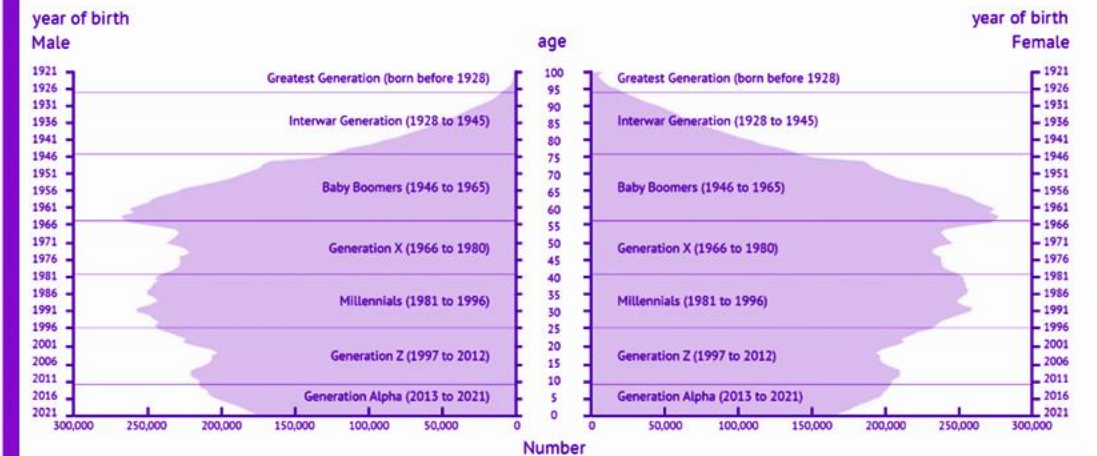
WHAT DOES GEN Z VALUE THE MOST IN THE WORKPLACE?



The Canadian population is changing rapidly due to baby boomers getting older and immigration boosting numbers in younger generations. These changes will have significant consequences on the labour market over time.

Over time, the workplace values and aspirations of Millennials and Gen Z will shape how people approach employment.

Age Pyramid of the Canadian Population (2021)

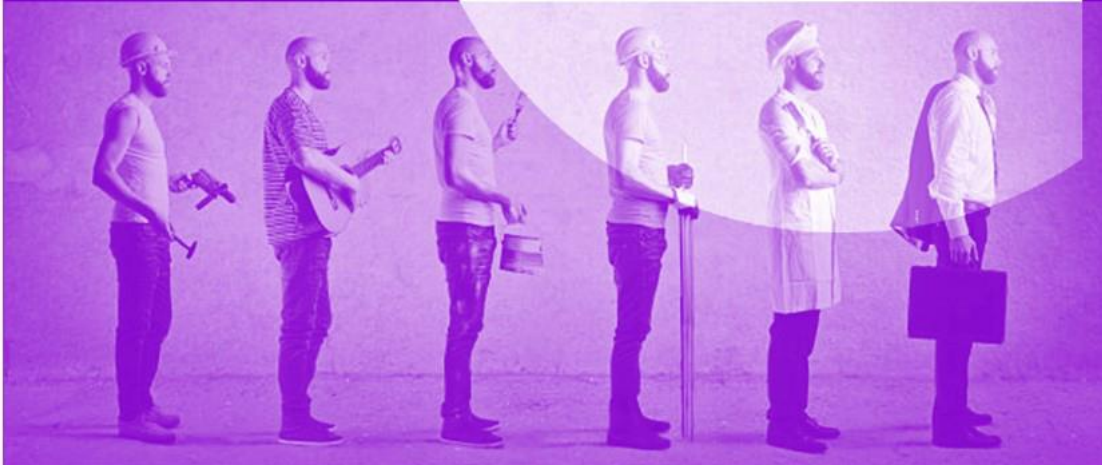
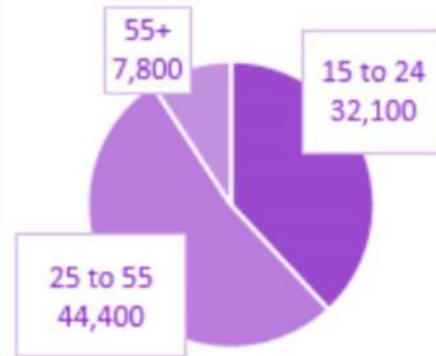


Source: Statistics Canada, 2021 Census

Fewer work transitions

Despite what we hear in the media about a great resignation and high mobility in the labour force, data for Nova Scotia shows the opposite seems to be happening.

Nova Scotia Work Transitions by Age



The percentage of workers in a job less than a year has been decreasing, from almost 50% in 1990 for part-time employment and 22% for full time employment to 28% and 16% in 2021. Employers are holding on to their workforce longer and as a result new skills are often learned on the job or not at all.

Percentage of Nova Scotia Workers at a New Employer Each Year - Age 15+



Source: Statistics Canada, Labour Force Survey

The digital literacy and skills needed for work are evolving exponentially

H.25

A broad suite of digital technologies are maturing and combining to disrupt employment and how we experience work.

New roles (jobs) for humans are likely to emerge, such as:

- » Data Auctioneers
- » Individualized Medicine Managers
- » AI Brokers
- » User Model Designers
- » AI Debuggers
- » Empathy Coaches
- » IOT Repair Technicians
- » Data Hygienists
- » Machine Psychologists
- » Truths and Metrics Directors



Traditional roles and jobs are being automated or broken down and reimagined, and new jobs are coming on stream as technologies mature and evolve. The merging of the virtual and physical worlds are enabling the creation of new business models.

Increasingly, workplace innovation is emerging from cooperation and collaboration with others to draw on existing knowledge to create new knowledge. The skills necessary for digital collaboration include adaptability, creativity, curiosity and open-mindedness.

To meet the new requirements of the labour market, a focus on lifelong capability building, driven in part by learners, is evolving from current education and skill development models.

Sources: AI Forces Shaping Work and Learning in 2030 IFTF, 2018; Accenture, 2021; Strada (2021) Examining the Value of Nondegree Credentials

Rising concerns over talent scarcity

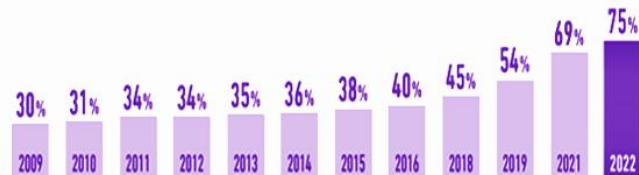
H.30

Talent scarcity is one of the key lenses through which the world of work will be seen in 2022.

Some reasons for this:

- the shift towards digitization;
- the green transition;
- lack of decent pay and working conditions;
- the push towards higher education in place of work-based training pathways; and
- the mismatch between education and workplace requirements.

Percentage of employers reporting difficulty finding talent with the right skills, global survey



Source: Manpower Group



Failure on the part of employers to invest in a more fulfilling employee experience and to meet growing demands for autonomy and flexibility at work are resulting in some employees choosing to withdraw entirely from traditional forms of full-time employment.

Job vacancies rise during first quarter of 2022



Sources: World Economic Forum, Adecco Group, 2022; Statistics Canada, Table 14-10-0400-01

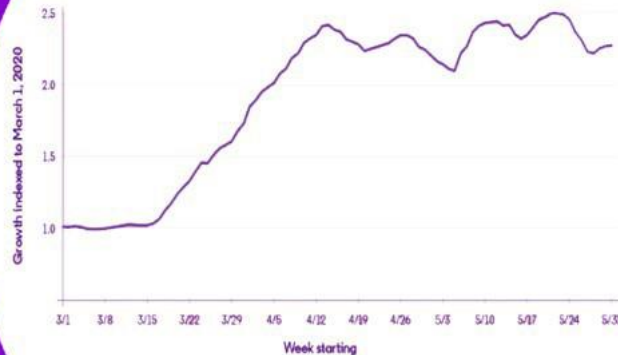
A shift towards hybrid and remote work

H.31

The COVID-19 pandemic has accelerated a trend in remote and hybrid work. This provides a host of opportunities and challenges.

In Nova Scotia, 33% of jobs can be performed remotely. Bridging the divide between on-site and hybrid employees is key to organizational cohesion, culture, and collaboration. Employers need strategies and tactics that foster hybrid equity.

Global Rise in Remote Job Applications
(Indexed to March, 2021)



DIMENSIONS OF HYBRID EQUITY
WHICH EMPLOYEES HAVE HYBRID WORK OPTIONS?

	HOW MUCH WORK IS REMOTE?	
	some	all
HOW MUCH WORK IS REMOTE?	some	all
	"CLASSIC" HYBRID Some are full-time on-site. Some are part-time remote. Some may be full-time remote. Key risk factors: resentment over hybrid privilege or pressure to spend time on-site	HYBRID INCLUSION All employees have at least occasional remote flexibility. Key risk factor: pressure to increase time on-site as path to promotion
HOW MUCH WORK IS REMOTE?	all	
	HYBRID FEUDALISM Some are full-time on-site. Some are full-time remote. Key risk factor: split between on- and off-site limits opportunities for mentorship and advancement	VIRTUAL WORKPLACE All employees are full-time remote. Key risk factor: reduced diversity due to exclusion of hires with less remote experience

As workers across the world continue to transition to home or hybrid arrangements, work hours and the length of the work week may evolve to better meet work life balance.



Source(s): Samuel, A. (2022, May 2). *The dimensions of hybrid equity*. Retrieved from Alexandra Samuel: <https://www.alexandrasamuel.com/remote-work/the-dimensions-of-hybrid-equity>; De Smet, A., Dowling, B., Mugayar-Baldocchi, M., & Schaninger, B. (2021, September 8). 'Great Attrition' or 'Great Attraction'? *The choice is yours*. Retrieved from McKinsey: <https://www.mckinsey.com/business-functions/people-and-organizational-performance/our-insights/great-attrition-or-great-attraction-the-choice-is-yours>

Job growth has been concentrated in services

H.32

Between 1999 and 2019, absolute employment growth in Nova Scotia has been concentrated in service sectors.

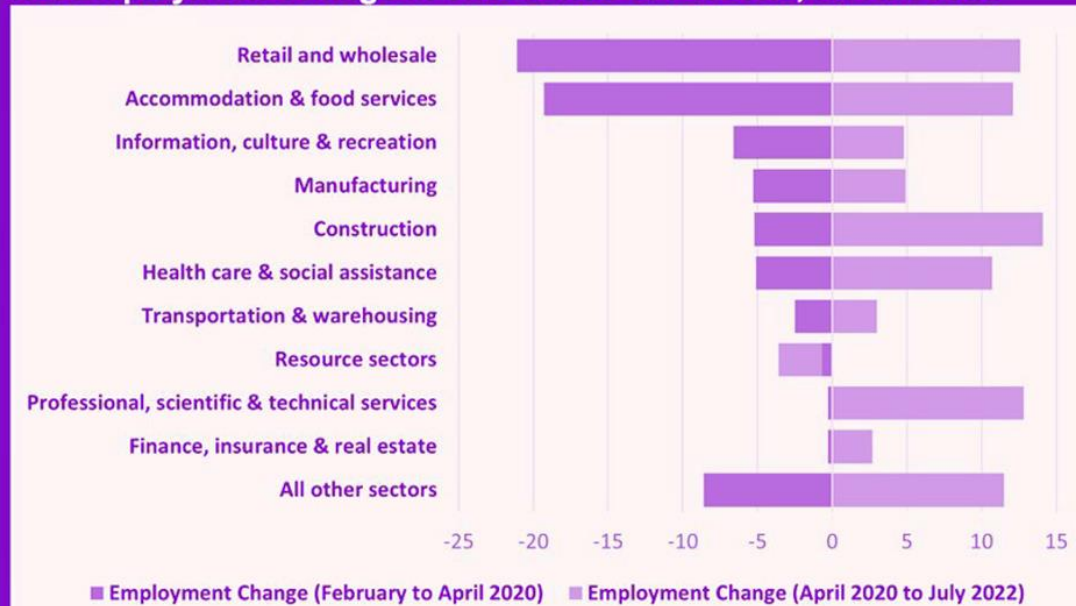
Employment Change in Nova Scotia 199-2019

Health Care and social assistance	+25,100
Construction	+12,600
Wholesale and retail trade	+11,800
Professional, scientific & technical services	+10,300
Acommodation and food services	+6,500
Resources sectors	-3,400
Manufacturing	-12,300



During the pandemic the largest net losses in employment were in retail, accommodations and food services as well as culture and recreation. Employment levels in these sectors have still not returned to pre-pandemic levels.

Net Employment Change in Thousands of Persons, Nova Scotia



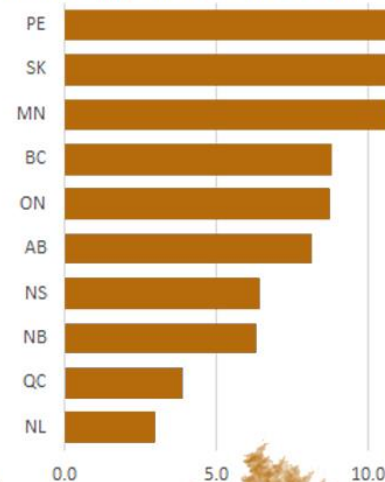
Sources: Statistics Canada, Labour Force Survey; Statistics Canada, 2016 Census

An increase in immigration to Nova Scotia

S.10

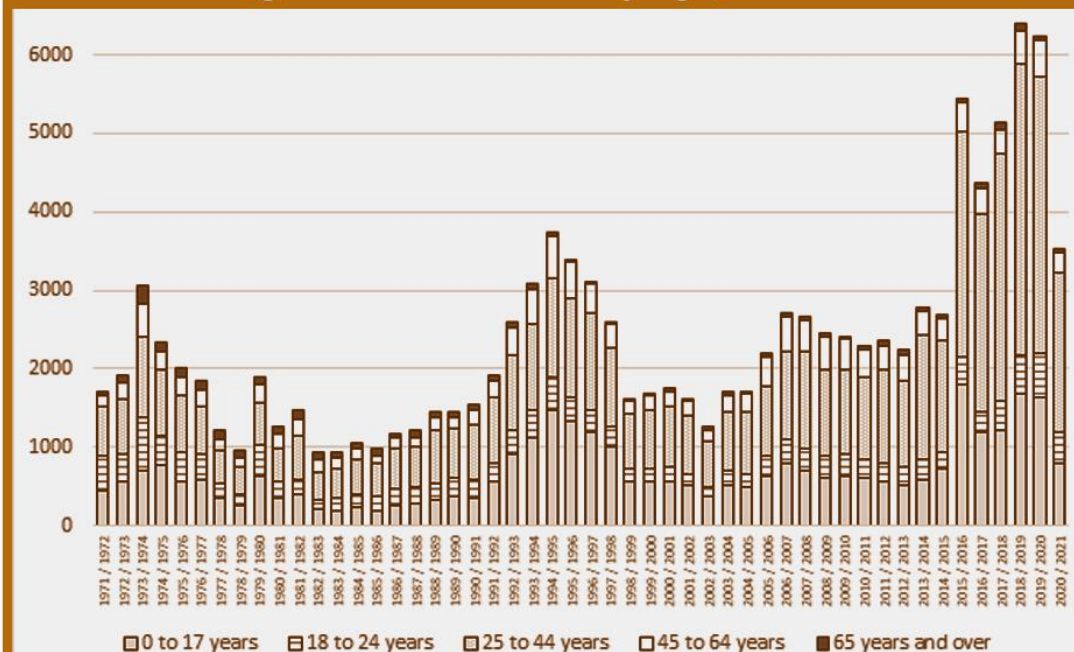
Nova Scotia has recently experienced record levels of immigration. A continuation of this trend will be necessary to achieve the government's population target by 2060.

New Immigrants per 1000 population, 2019/2020



Retaining immigrants in Nova Scotia will require welcoming communities and ensuring the appropriate services exist to support these newcomers.

Number of Immigrants to Nova Scotia by Age, 1971-2021



Source: Statistics Canada, Tables 17-10-0014-01 and 17-10-0005-01

People are living longer, healthier lives

S.20

Longer life spans may impact labour force participation rates. People living healthier lives for longer will expect greater independence in older adulthood than previous generations.

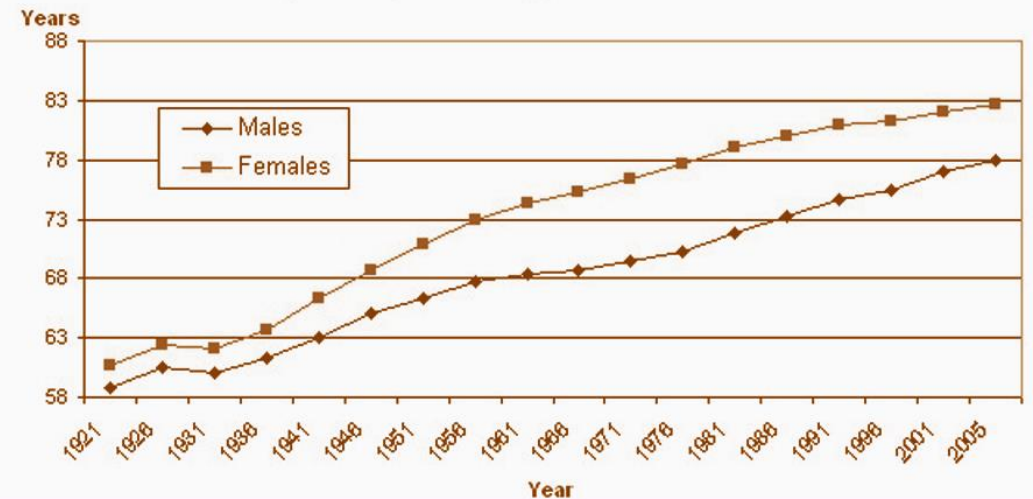
Global Life Expectancy

Projected global life expectancy at birth*



Thanks to advances in science, medicine, and social policy, many people in Canada are living longer, healthier lives. This reflects global trends: by 2050, the number of people aged 60 and over will double to more than 2 billion. But social and economic inequity continues to impact lifespans for many in Canada, in particular Indigenous people.

Life expectancy at birth, by sex, Canada, 1956 to 2005

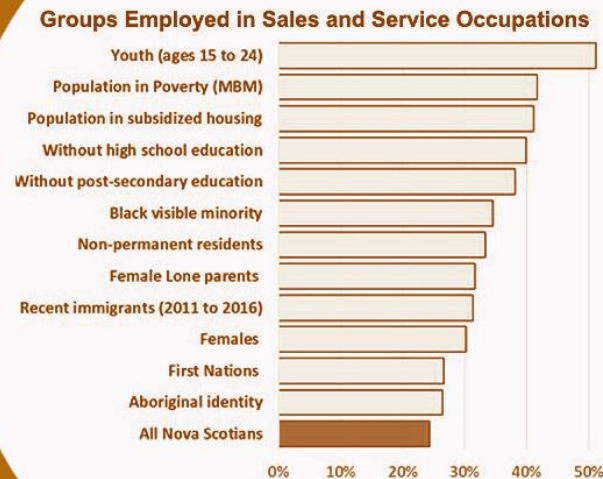


Source: Statistics Canada; United Nations, World Population Prospects; Policy Horizons Canada. (2022). *FUTURE LIVES: Exploring Life Course Transformations*. Canada: Policy Horizons Canada.

Higher unemployment rates persist among some groups

Unemployment rates have been continuously higher among First Nations, African Nova Scotians, in marginalized communities and for people living with disability.

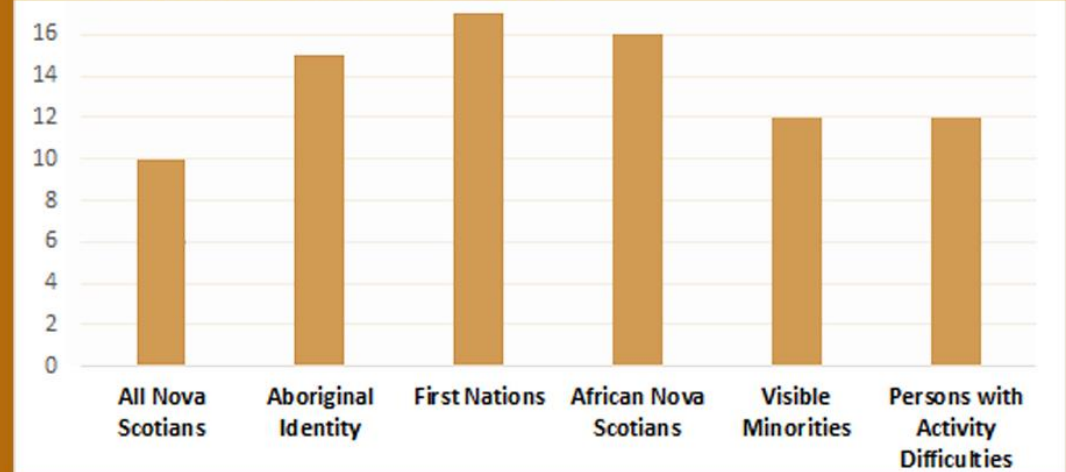
Service sectors that were more heavily disrupted by the pandemic also tend to disproportionately employ groups who are more financially vulnerable to work interruptions.



Addressing inequitable treatment of Indigenous people at work is a key part of the Truth and Reconciliation Commission's Calls to Action.

More detailed and timely data of underrepresented groups in the labour force is needed for better decision-making. The sovereignty of Indigenous peoples' data is a key issue, as is the appropriate use of race-based data.

Unemployment Rates, 2016 Census



Source: Statistics Canada, Labour Force Survey and 2016 Census; ; Statistics Canada (2020) Work interruptions and financial vulnerability, Catalogue no. 45280001

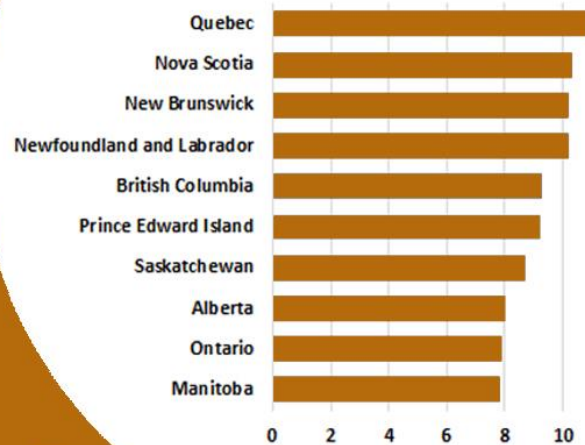
Mental health and increasing absenteeism

S.22

Absenteeism among workers results in significant losses in economy-level output and in productivity measured on a per-person-employed basis.

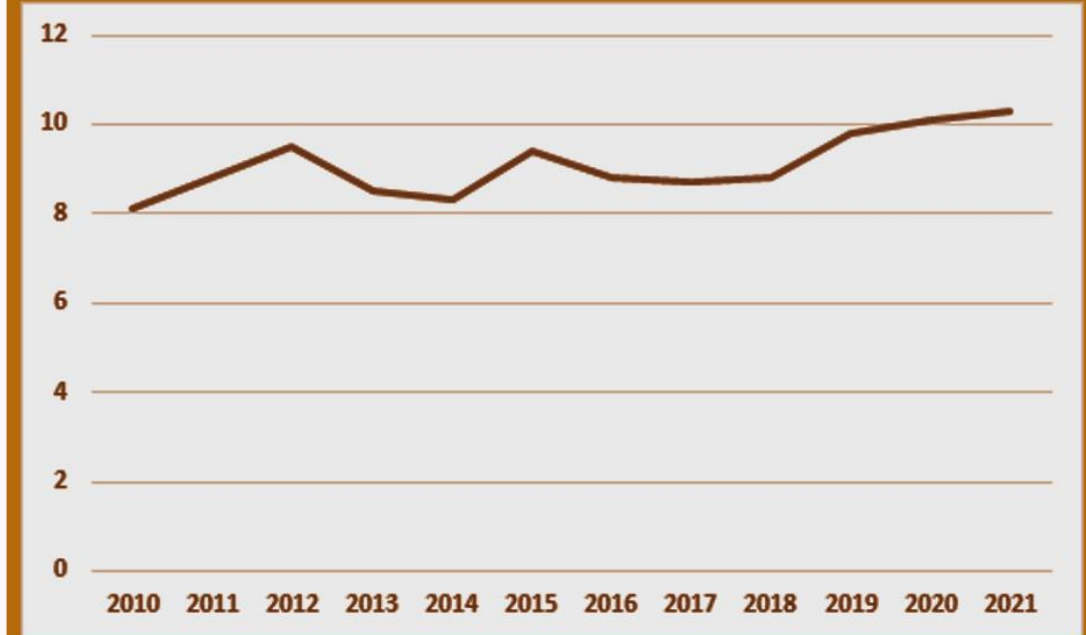
Employee burnout is a key driver of employee well-being and productivity, impacting organizational commitment, job performance and absenteeism.

Days lost per worker in a year, illness or disability, 2021



Beyond physical illness and disabilities, mental health leaves account for an increasing share of absenteeism.

Days lost per worker in a year, illness or disability
Nova Scotia, 2010-2021



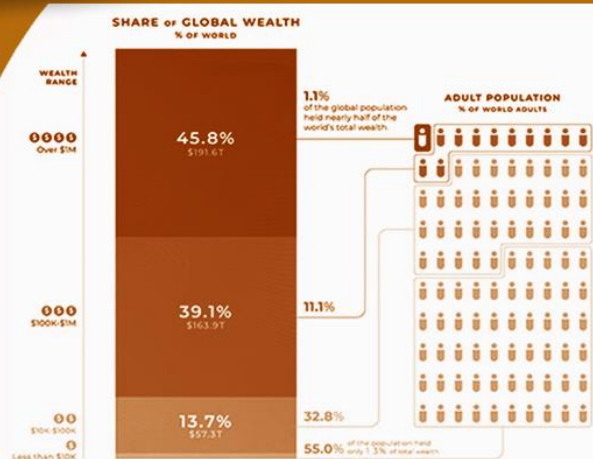
Source: Statistics Canada, Table 14-10-0390-01

S.30

Income inequality is rising globally

Worldwide, there are growing economic inequalities. The richest one percent of the world's population now controls almost half of all global wealth.

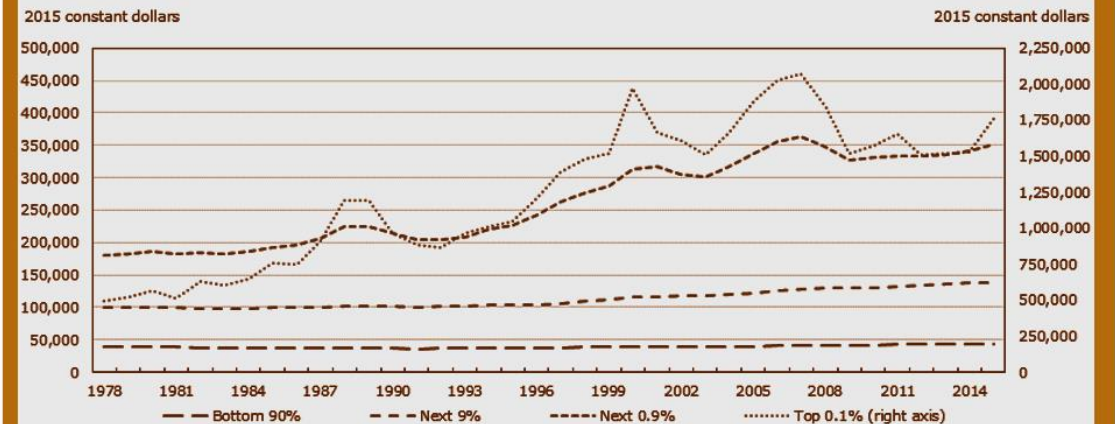
Consistent with trends in other countries, earnings gains in Canada have been largest among individuals at the top of the distribution.



The under-representation of women in top earnings groups accounts for a substantial (more than half) and growing share of the overall gender gap in annual earnings.

A fairer society tends to expand educational opportunities for all, which can result in greater labour productivity.

Average real annual earnings in earnings groups, Canada, 1978 to 2015



Source: Statistics Canada (2019) Earnings Inequality and the Gender Pay Gap in Canada: The Role of Women's Under-representation Among Top Earners;

Trust in institutions has been declining

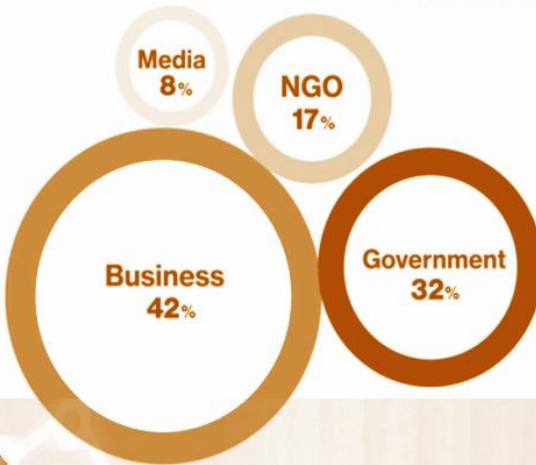
S.31

Trust in institutions has been declining in recent years.

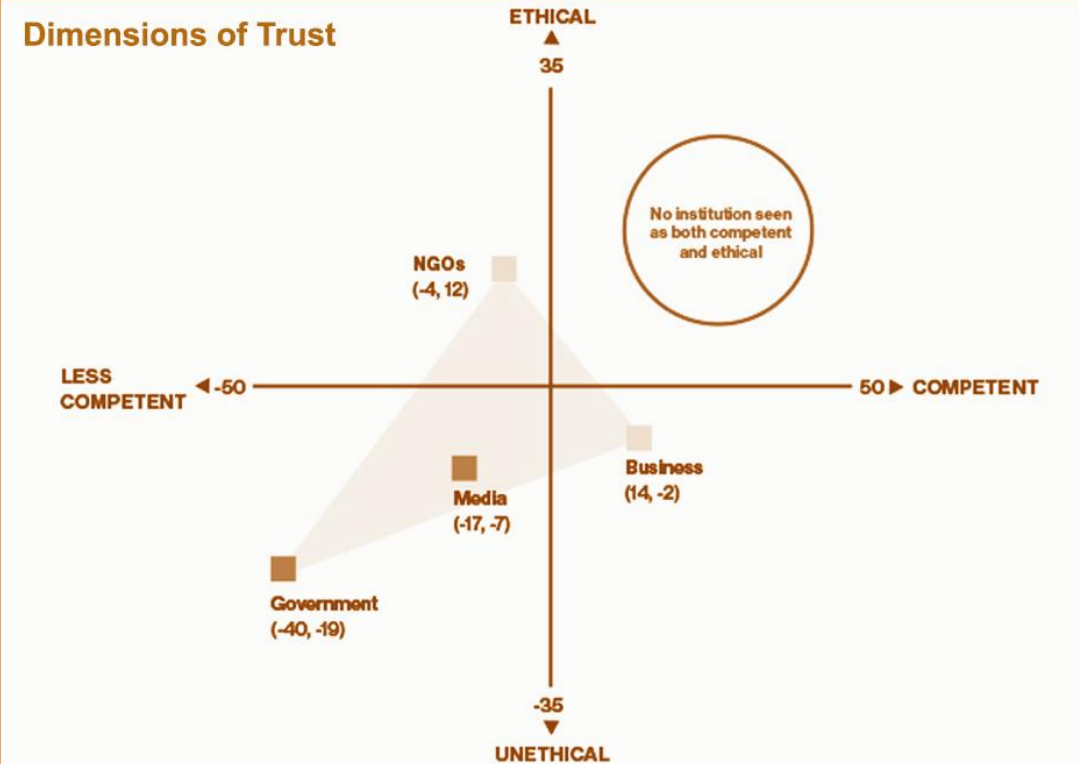
Distrust is being driven by a growing sense of inequity and unfairness in the system. There is a perception that institutions increasingly serve the interests of the few over everyone.

Retraining for jobs is a critical issue, but less than half of people trust any type of institution for training.

Which do you trust most on job retraining?
Percent who trust



Among organizations, NGOs are seen as ethical but not competent, business competent, but not ethical. Government and traditional media fail on both.



Source: Edelman Trust Barometer, 2020.

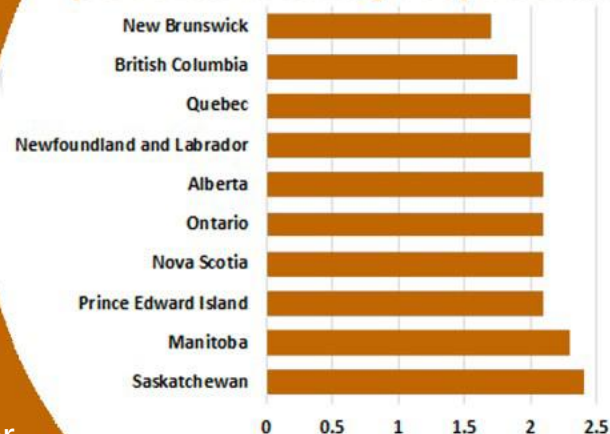
Changes in female labour force participation and family caregiving

S.32

The makeup of households and work-from-home arrangements are affecting trends in caregiving and support from families.

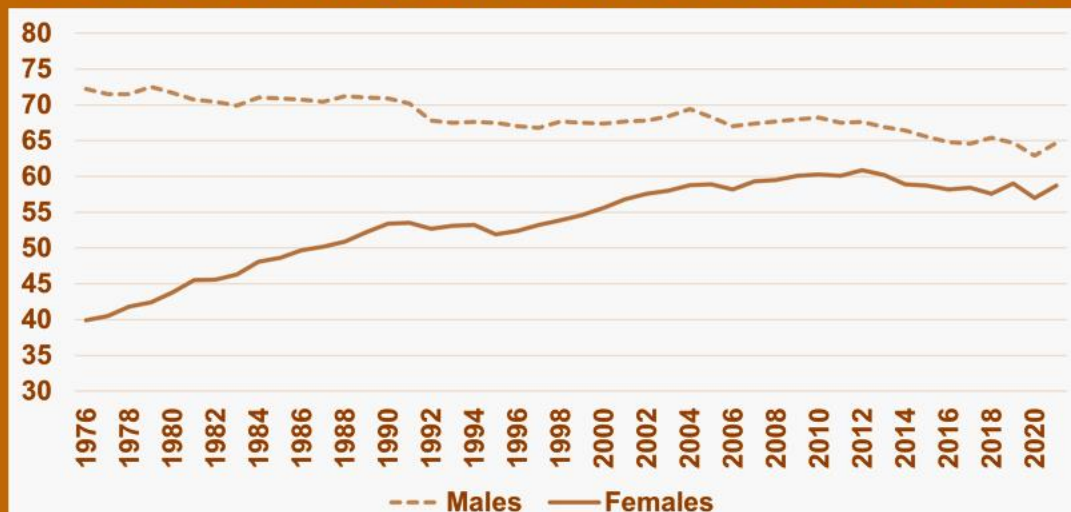
In 2017, a quarter of Canadians had cared for someone with long-term needs. Currently, younger family members do much of the eldercare. An older population may increase absenteeism for care unless alternative arrangements are provided.

Days lost per worker in a year, personal or family responsibility



Women spend, on average, 3 hours and 44 minutes per day on unpaid work, compared with an average of 2 hours and 28 minutes for men. While women's labour force participation has increased since the 1970s, it has stalled in Nova Scotia over the past decade. This trend may be influenced by people having fewer children later, and access to affordable childcare.

Labour Force Participation Rates, Nova Scotia (percentage)



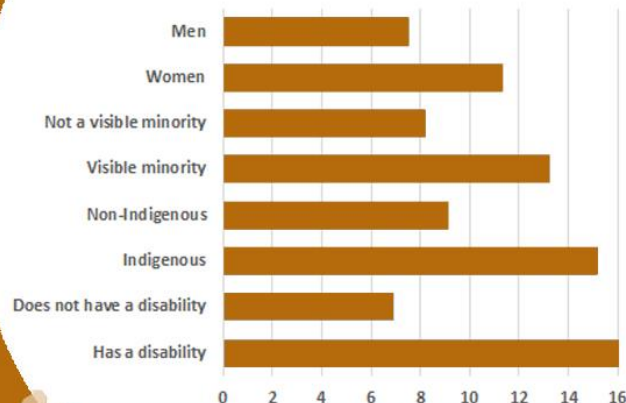
Source: Statistics Canada, Table 14-10-0390-01; OECD, (2020) "Employment: Time Spent in Paid and Unpaid Work, by Sex,"

Diversity, Equity and Inclusion workplace strategies are evolving

S.33

As work and the workplace change and evolve, inequality will manifest in new ways. Employers and government are actively considering how to mitigate and remove inequities, through a focus on DEI strategies in workplaces

Persons who experienced discrimination at work, Canada, 2016



Social isolation within the workplace reduces productivity and negatively impacts employee health and wellbeing. When workers feel they belong, there is better job performance, lower turnover risk, and fewer sick days. Discrimination and bias in the workplace also reduce employee wellbeing and organizational productivity. Interpersonal relationships have a significant effect on job satisfaction and engagement (with relationships between employees and managers having the most significant effect).

From Awareness To Implementation In One Year

2021	2022
37% of employers reported they did not have a diversity and inclusion strategy	37% of employers say more than ever, candidates expect to learn about a company's DEI efforts.
The top DEI priorities: 1. Employee training (42%) 2. Gender pay equity (40%) 3. Building a diverse workforce (34%)	The top DEI priorities: 1. Building a diverse workforce (39%) 2. Gender pay equity (36%) 3. Creating a system/process (i.e. mentorship programs) (28%)

This increases to 47% among Gen Z recruiters

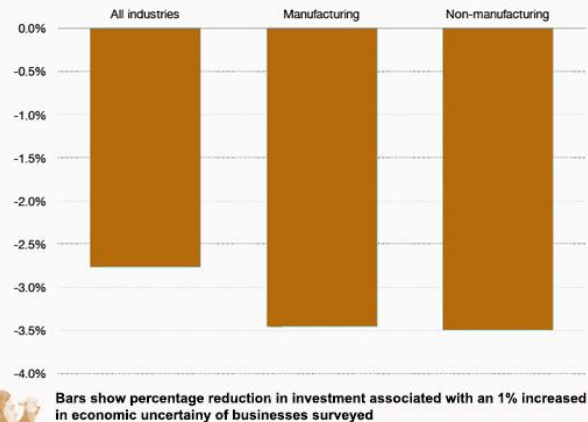
Sources: https://hero-health.org/wp-content/uploads/2020/03/HERO_SDoH_EmployerActionSteps_032420.pdf; <https://hbr.org/2019/12/the-value-of-belonging-at-work>; <https://www.prnewswire.com/news-releases/discrimination-at-work-prevalent-yet-subtle-workplace-bias-reduces-productivity-and-engagement-300426635.html>

Rising business uncertainty

S.34

When uncertainty is high, businesses are less likely to invest in new factories or equipment, that in turn reduces productivity growth. Unfortunately, due to the pandemic and geopolitics, the International Monetary Fund's uncertainty index has risen to a record high.

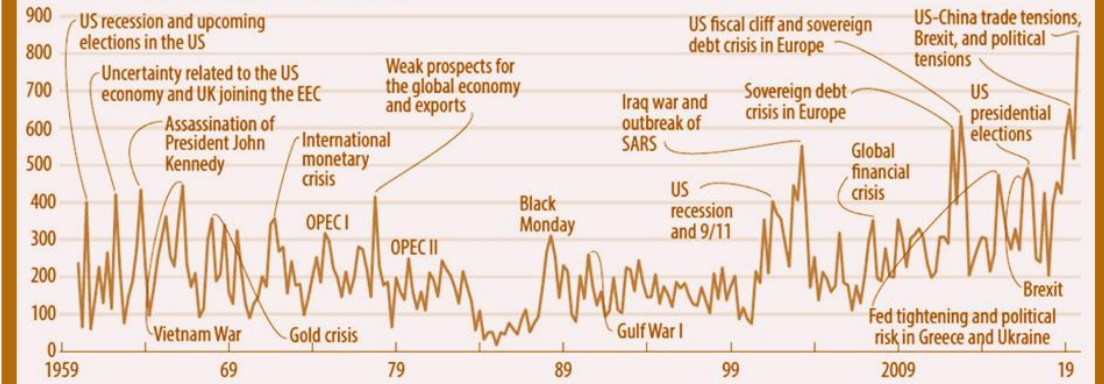
Uncertainty and Business Investment



Uncertain times

Global uncertainty has surged to a record high.

(WUI index: 1959 Q1 to 2019 Q4, GDP weighted average)



Areas of disruption



Inflation

6.8% year-over-year change in CPI¹ in November 2021, the fastest pace since 1982



Labor mismatch

4.3 million+ quit in August 2021, a record 2.9% of workers



Supply chain shortages

Just 1 in 3 container ships arrive on time



Omicron impacts

21 percentage point decrease in pandemic optimism since October (from 51% to 31%)



Geopolitical uncertainties

1 in 7 leaders surveyed see geopolitical instability as a potential risk to growth



Energy market volatility

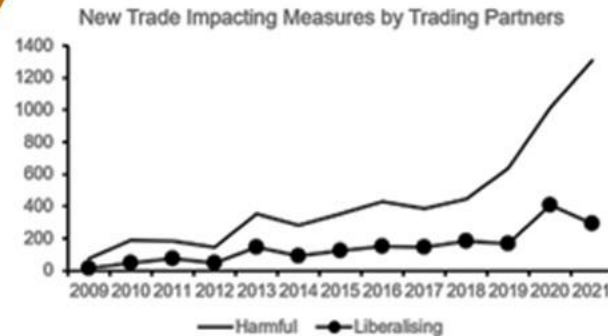
50% increase in US natural gas prices since January 2021

Sources: International Monetary Fund (IMF), McKinsey, 2022

Increasing trade protectionism

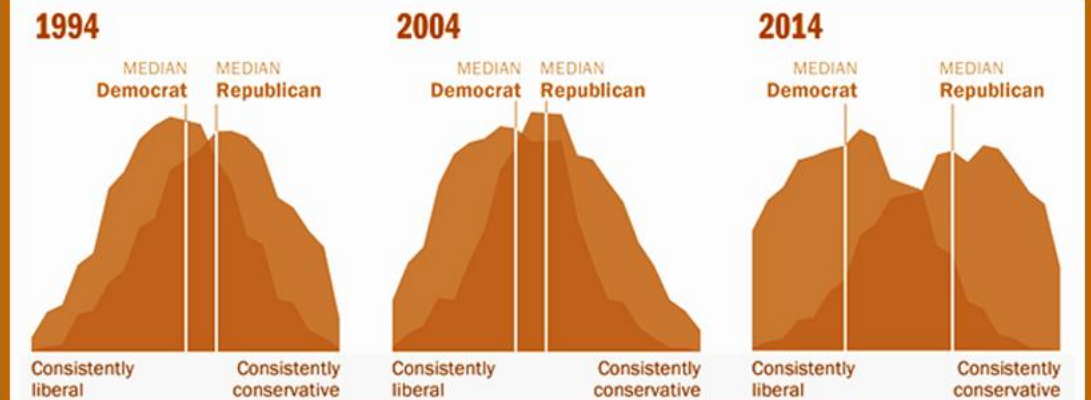
S.40

Protectionism is the policy of restricting imports from other countries by methods such as tariffs on imported goods, import quotas, and a variety of other government practices.



There has been an increasing trend towards protectionism among Canada's trading partners. While new trade agreements have brought down tariffs for key Nova Scotia exporters, there has been an accelerating number of non-tariff barriers as a result of the Covid-19 pandemic, with countries seeking to ensure adequate domestic supply of critical goods, to reduce supply chain disruptions and bottlenecks, and to respond to increased nationalism, populism and polarisation.

U.S. Politics is more Ideologically Divided

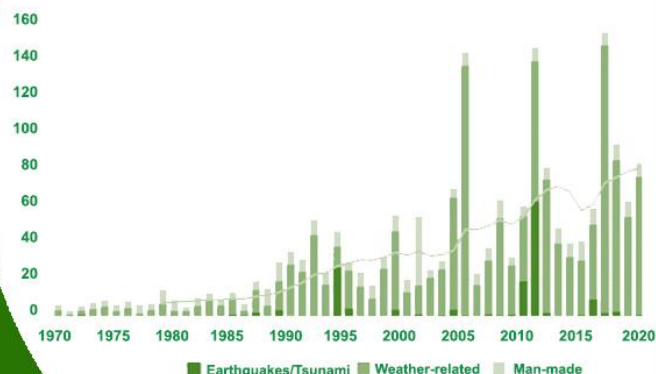


Source: Global Trade Alert; PEW Research Centre

Migration due to climate change is on the rise

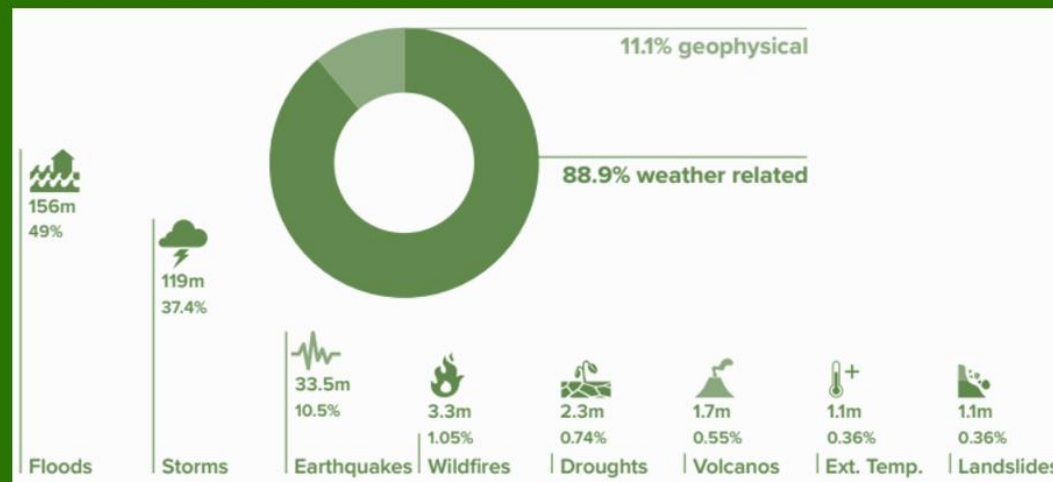
The risks the world faces from climate-related natural catastrophes are on the rise. That's because we live, build and work in locations most at risk from floods, wildfires, and extreme weather events.

Global Insured losses, 1970-2020 in USD billions



Between 2008 and 2020, an annual average of 21.5 million people have been forcibly displaced by weather-related events – such as floods, storms, wildfires and extreme temperatures. These numbers are expected to surge in coming decades with one forecast predicting that 1.2 billion people could be displaced globally by 2050 due to climate change and natural disasters.

Environmental Displacements, 2008-2020



Sources: Swiss Re Group; United Nations High Commissioner for Refugees (UNHCR)

Increasing demand for sustainable forestry

In 2020, Nova Scotia's timber industry directly supported 1,900 jobs.

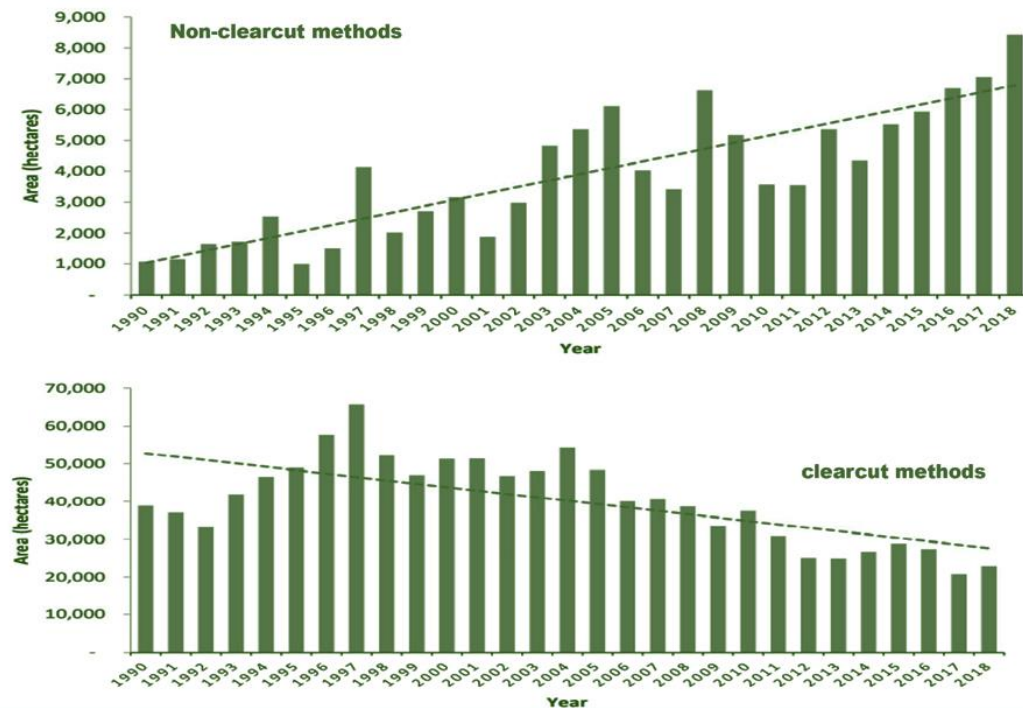
While climate impacts will put provincial timber resources at greater risk of wildfires and timber pests, increased demand for low carbon materials will increase demand for timber products.

Emissions from selected building materials

Wood Alternative	Current Material
Canadian Produced Mass Timber (production emissions) 211-300kg of CO ₂ e per tonne of material ¹¹³	One tonne of steel produces on average: >1.1t CO ₂ e from domestic Canadian production ¹¹⁴ >2.4t CO ₂ e global average ¹¹⁵ One tonne of cement produces: >.8-.9 t of CO ₂ e ¹¹⁶

Since 1990, sustainable harvesting practices have become more common in Nova Scotia, while clear-cutting is decreasing.

Summary of Nova Scotia harvested by method, 1990-2018. Dashed line represents linear trend



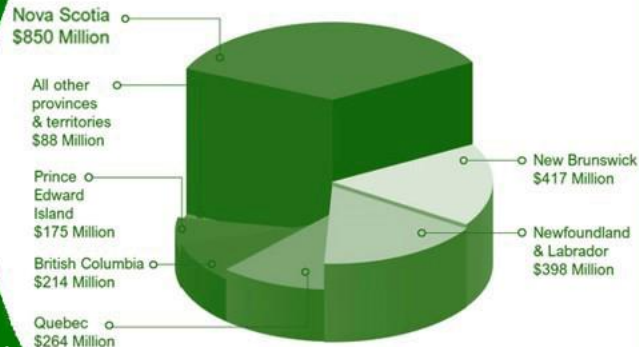
Sources: Allan, B., Eaton, D., Goldman, J., Islam, A., Augustine, T., Elgie, S., and Meadowcroft, J. (2022). Canada's Future in a Net-Zero World: Securing Canada's Place in the Global Green Economy. Smart Prosperity Institute, Transition Accelerator and Pacific Institute for Climate Solutions; Statistics Canada, Labour Force Survey, Table: 14-10-0023-01.

Warming oceans are impacting Atlantic fisheries

Nova Scotia generates 30% of Canada's seafood exports.

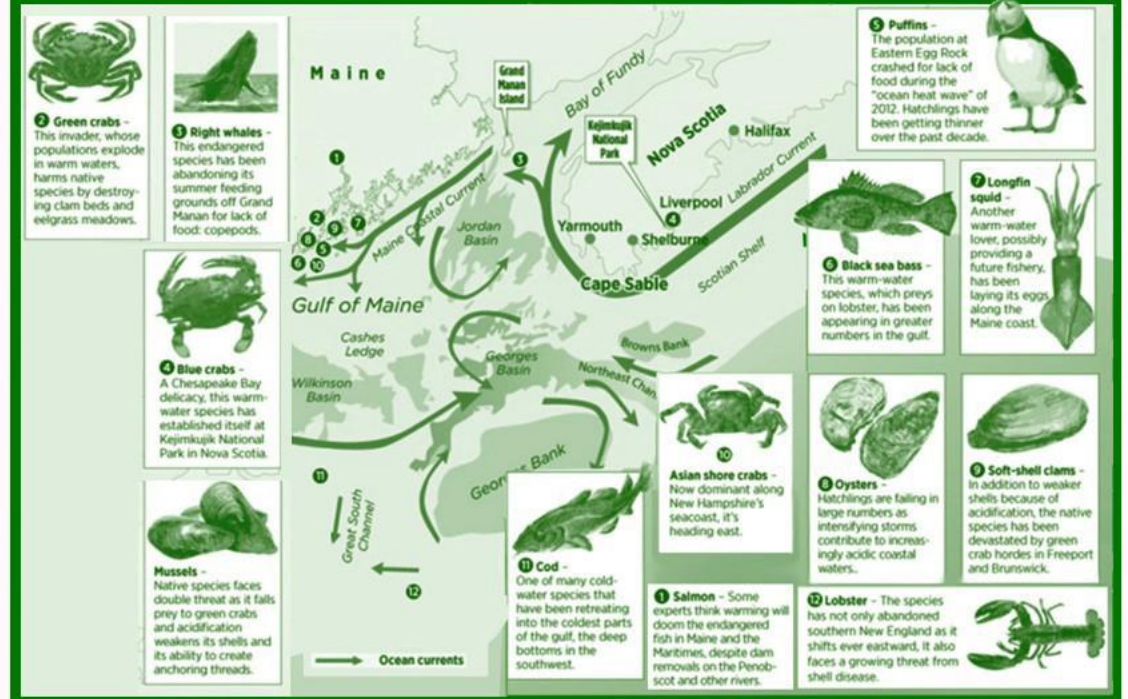
Ocean waters off Nova Scotia have warmed faster than the global average. For instance, the Gulf of Maine has warmed faster than 99% of the world's oceans at .03 °C per decade.

Canada's Nominal GDP in Commercial Fisheries



A continuation of this trend may negatively impact some fisheries, but could also shift the range of other species northward, including new species of commercial interest.

Movement of species in the Gulf of Maine



Source: Forsyth, J. S. T., M. Andres, and G. G. Gawarkiewicz. (2015). Recent accelerated warming of the continental shelf off New Jersey: Observations from the CMV Oleander expendable bathythermograph line. *Journal of Geophysical Research: Oceans* 120: 2370-2384.

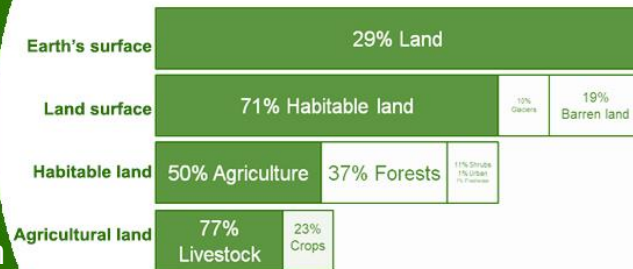
Agriculture faces climate-related challenges and opportunities

N.22

Over the century several trends will create competing demands for a limited supply of agricultural land:

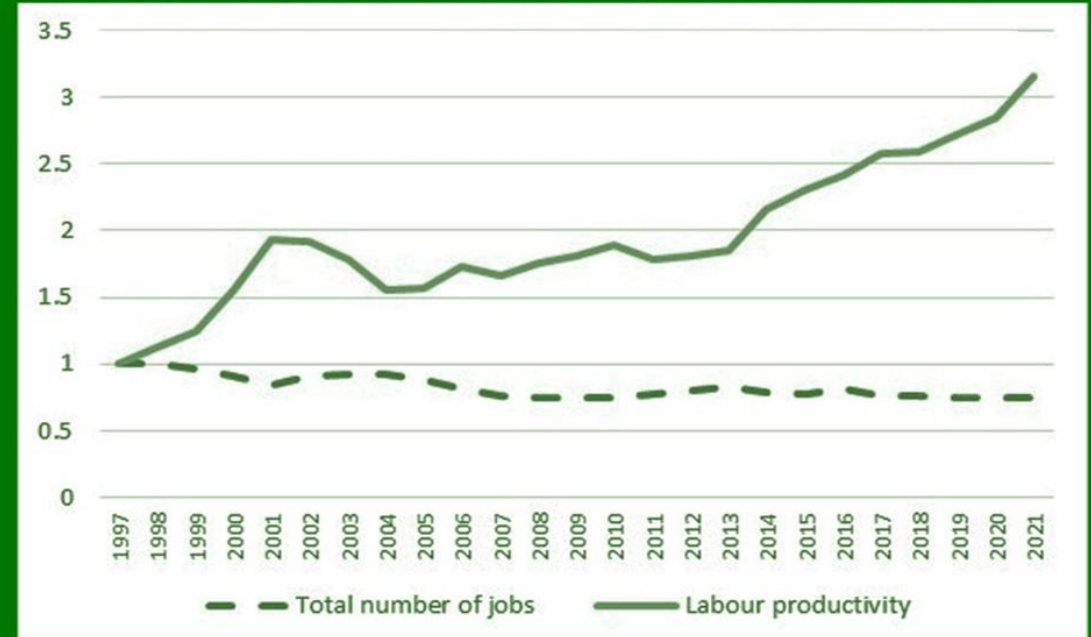
- growth in global population to 10 billion by 2050;
- changing diets;
- increased biofuel demand; and
- feedback between agricultural systems, and climate change.

Global Land Use for Food Production



Productivity in Nova Scotia's agriculture industry has risen faster than the national average since 1997, but remains 62% of the national average. Climate change impacts may both lengthen the growing season for some crops, but bring a heightened risk of drought.

Nova Scotia, Crop and Animal Production, 1997-2021 (index)



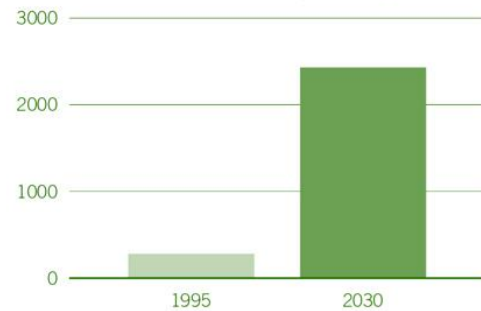
Source: Statistics Canada, Table: 36-10-0480-01; Ritchie, H. (2019). *Half of the world's habitable land is used for agriculture*. Our World in Data

Climate change is impacting labour productivity

N.23

Heat stress is a major consequence of global warming. Extreme heat can negatively impact health and labour productivity, especially for outdoor workers.

Global GDP loss to heat stress (US\$ Billions)



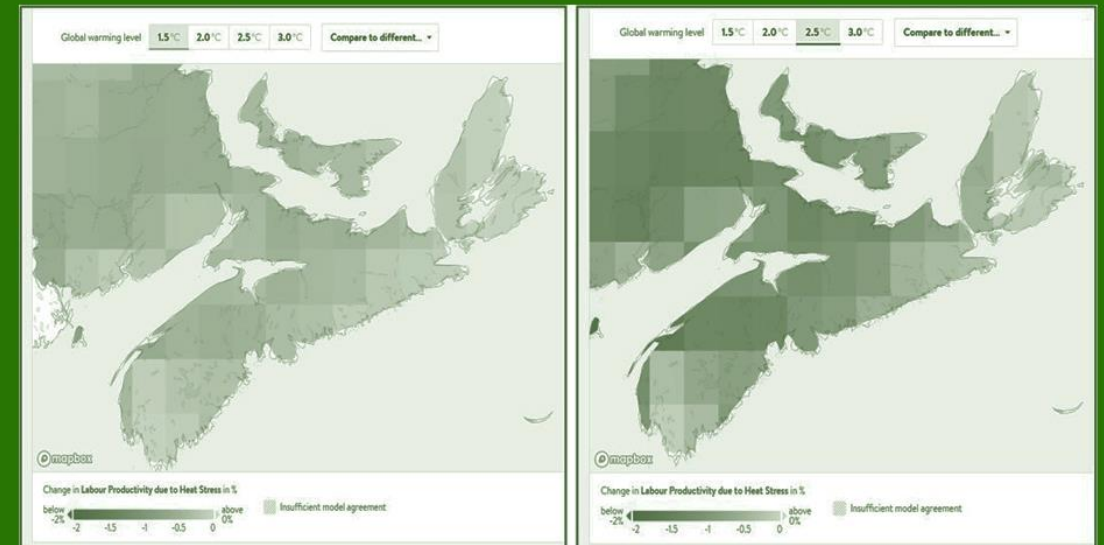
TOURISM



Climate change may extend the tourism season, with the exception of winter activities. However, extreme weather events may cause interruptions.

In 2030, more than 2 per cent of total working hours worldwide is projected to be lost, either because it is too hot to work or because workers have to work at a slower pace. The cost of doing business may increase from installing and operating cooling systems, to higher insurance rates, infrastructure repair costs, and work disruptions due to more intense storms.

Estimated Changes in Labour Productivity due to Climate Change



Source: Nova Scotia Environment and Climate Change. (2022). Understanding Climate Change Impact in Relation to Wellbeing for Nova Scotia. Final Synthesis Report; 'Working on a warmer planet: The impact of heat stress on labour productivity and decent work' International Labour Office – Geneva, ILO, 2019; Climate Analytics, 2022

Increasing trend of drought occurrence

N.30

Climate change affects farms; for example, drought can negatively impact crops and livestock

Conditions, August 31, 2020

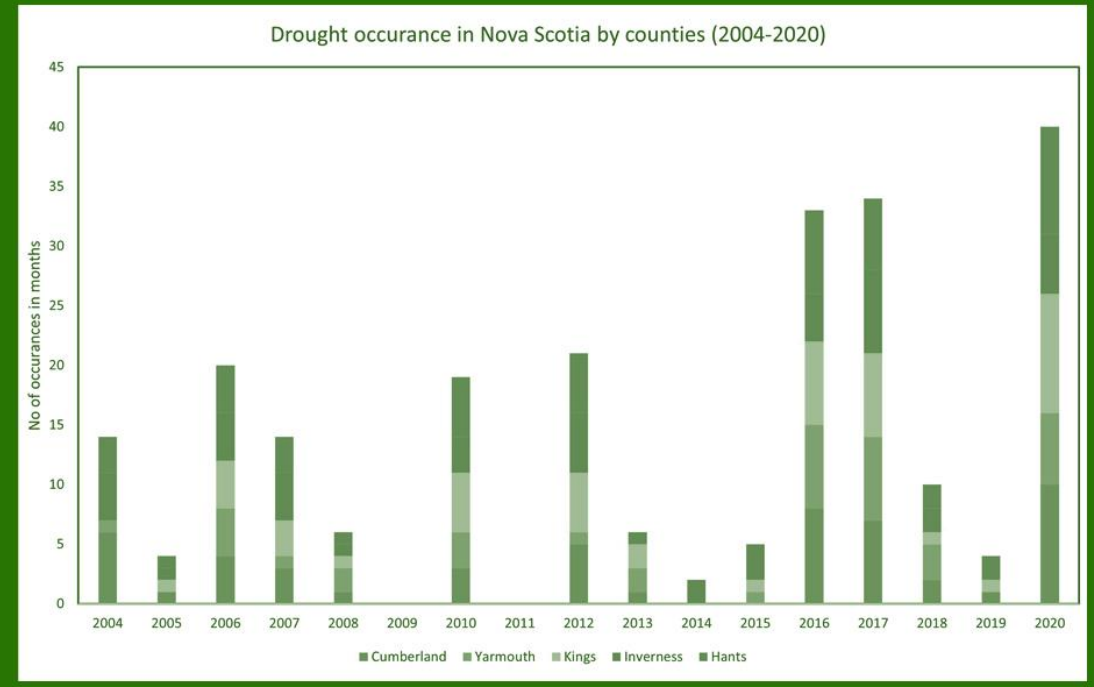
Drought Intensity

- D0 - Abnormally dry
- D1 - Moderate drought
- D2 - Severe drought
- D3 - Extreme drought
- D4 - Exceptional drought
- Drought not analyzed



Droughts can have a major impact on agriculture productivity.

The graph below shows an increasing trend of drought occurrence in Nova Scotia between 2004-2020.



Source: CLIMAtlantic, 2022

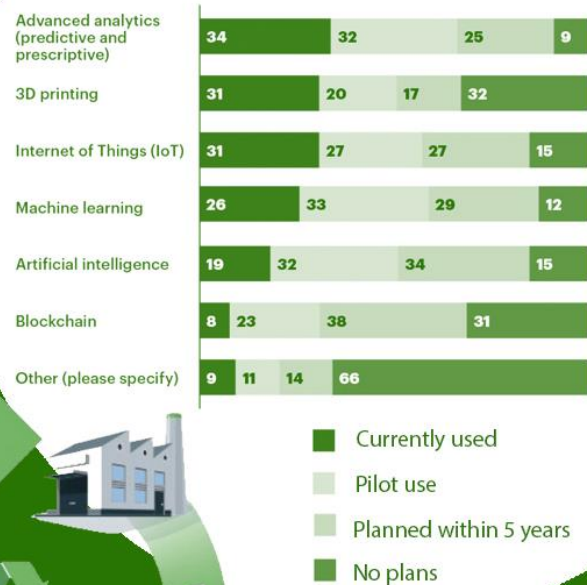
More interest in circular economy strategies

N.31

The prevailing economic model is a “take-make-waste” linear model. In contrast, a circular economy aims to create as much value as possible by recycling, refurbishing, reusing, or repurposing products and materials.



Digital Tech used to enable the Circular Economy



Circular economy strategies are expected to create 75,000 jobs in Finland and 300,000 jobs in France. Nova Scotia has shown leadership in the area of waste reduction. In 2012, Nova Scotia had the lowest amount of waste generated per capita among all provinces (386 kg).

Waste Generation by Source, 2012
(kilograms of un-diverted waste per capita)



Sources: Statistics Canada; The Conference Board of Canada.

Note: Data for residential and non-residential waste generation for Newfoundland and Labrador is suppressed by Statistics Canada for 2010 and 2012, so the values reported here are from 2008.

Sources: OECD; Statistics Canada; Conference Board of Canada

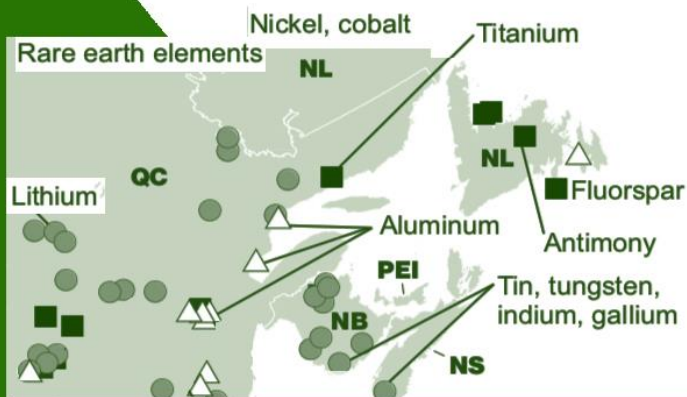
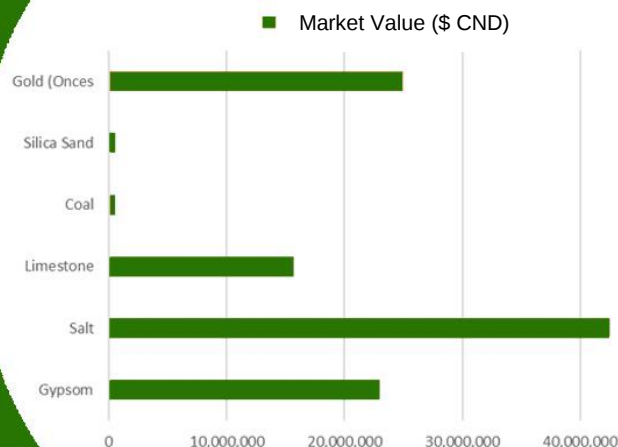
Clean technologies are fueling growing demand for critical minerals

N.32

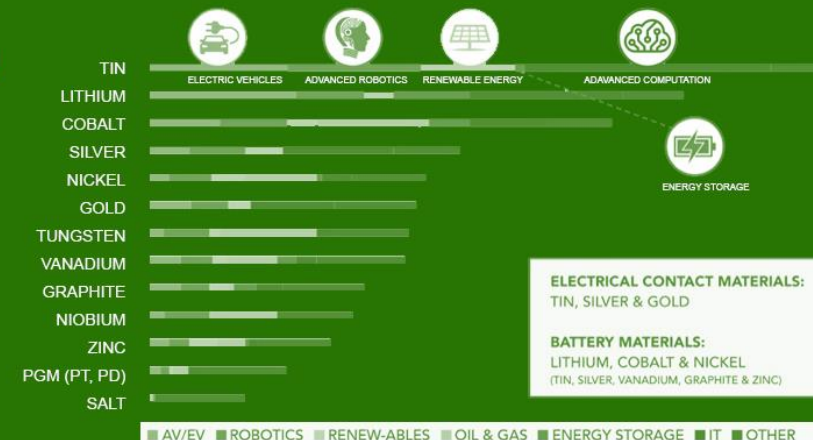
Nova Scotia has had a recent increase in mineral exploration and development.

Critical minerals – used in computers, phones, and electric vehicles - are needed to grow industries like clean technology, health care, and ICT.

Mineral Production 2017



Metals needed to supply emerging technologies



Nova Scotia Production

Gold (troy ounces)	Gypsum (million tonnes)	Salt (million tonnes)	Silica Sand (tonnes)	Coal (million tonnes)
2010 0	2010 2.6	2010 0.89	2010 20,320	2010 0.61
2011 0	2011 2.3	2011 0.85	2011 14,744	2011 0.47
2012 0	2012 1.8	2012 0.70	2012 19,134	2012 0.50
2013 0	2013 1.8	2013 0.64	2013 15,471	2013 0.40
2014 552	2014 1.8	2014 0.87	2014 16,336	2014 0.37
2015 0	2015 2.0	2015 0.97	2015 11,810	2015 0.35
2016 0	2016 2.0	2016 0.74	2016 10,651	2016 0.35
2017 15,577	2017 2.1	2017 0.94	2017 12,380	2017 0.37

Sources: U.S. White House (2021) Building Resilient Supply Chains; [GEO ExPro - Exploring the Spectacular Geology of Nova Scotia](#); Nova Scotia Department of Energy and Mines.

Increasing opportunities in the oceans economy

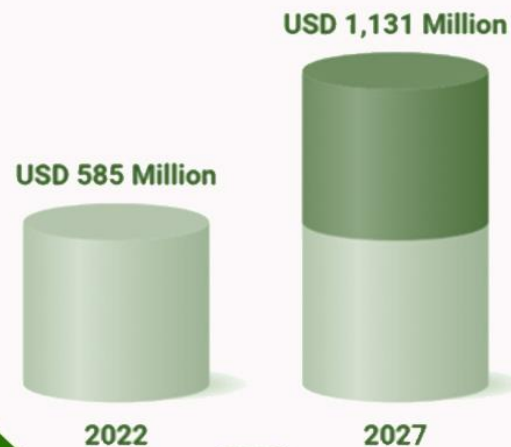
N.40

With 13,300 kilometres of coastline, Nova Scotia's economy is defined by the sea.

Whether it's a growing population, rising incomes, or changing food preferences; greater calorie production from our oceans is likely.

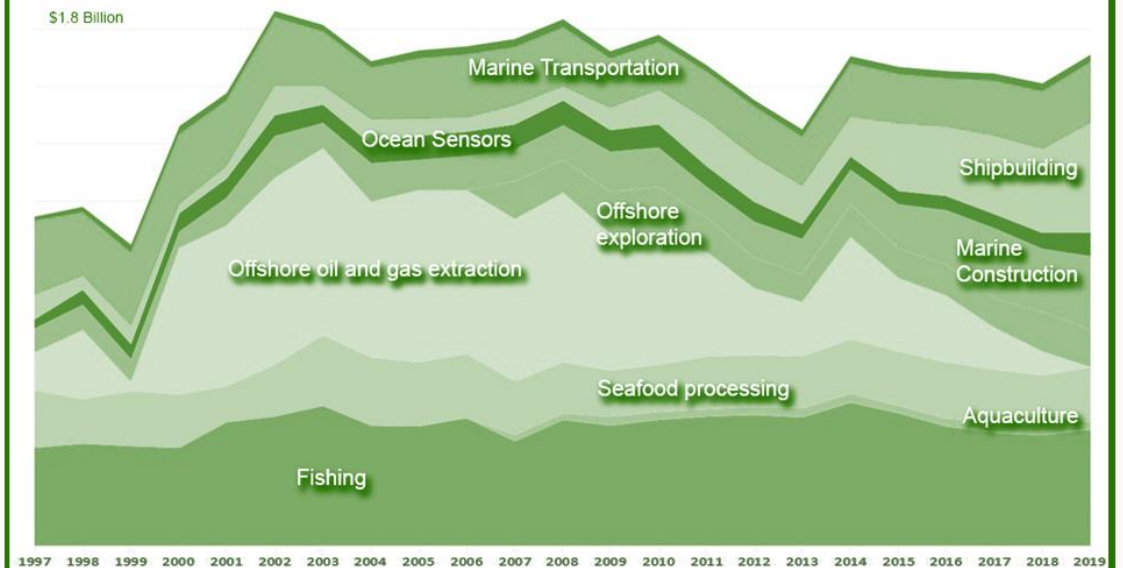
This includes novel approaches such as floating marine platforms to grow sea plants, as well as shellfish, simultaneously at different levels of the water column, providing an opportunity to increase productivity.

Global Seaweed Protein Market
Market forecast to grow at a CAGR of 14.10%



Ocean industries will continuously undergo significant change in the coming decades, driven by global demand and environmental necessity. There is growing opportunities in the areas of food, renewable energy and feed.

Nova Scotia's Dynamic, Portfolio of Ocean Sectors

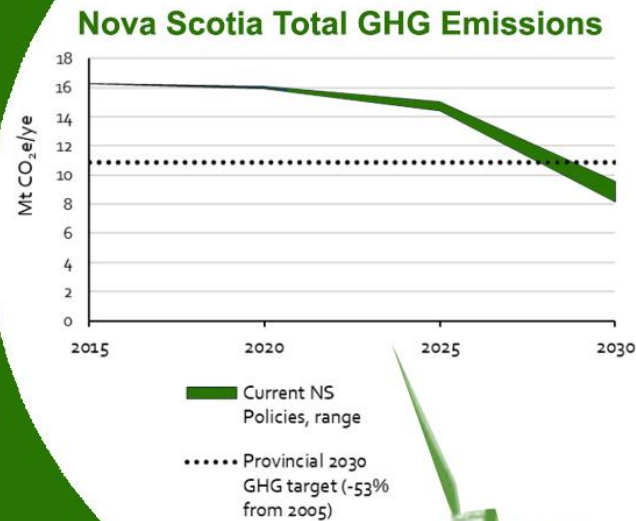


Sources: Poore, J., & Nemecek, T. (2018). Reducing food's environmental impacts through producers and consumers. *Science*, 360(6392), 987–992; Fisheries and Oceans Canada. (2013). Assessment of Information on Irish Moss, Rockweed and Kelp Harvests in Nova Scotia.

Nova Scotia has been transitioning to more renewable energy

N.41

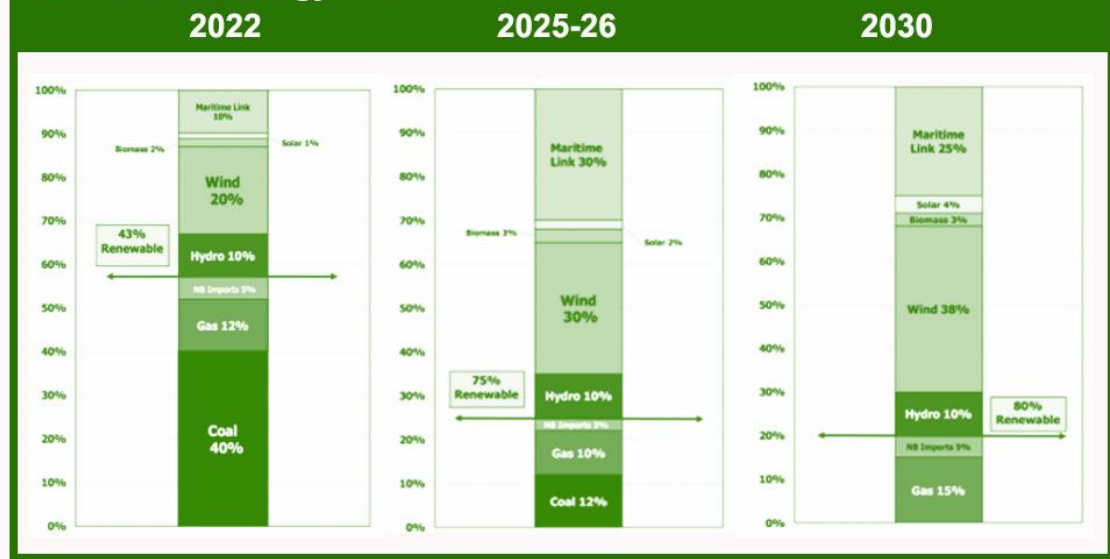
Nova Scotia has been transitioning to more renewable energy that includes include wind, hydro, solar, tidal and bio-fuel power production. There is also a project for exploring geo-thermal energy production in Nova Scotia for municipal electricity production and green houses.



Carbon emissions from electricity are 43% below 2005 levels and renewable electricity has increased from 9% to 30% in the last decade. Nova Scotia has set a goal to phase out coal-fired electricity and generate 80% of the Province's electricity requirements by renewables by 2030.

The Province has set a goal of net zero emissions by 2050.

Nova Scotia Energy Mix



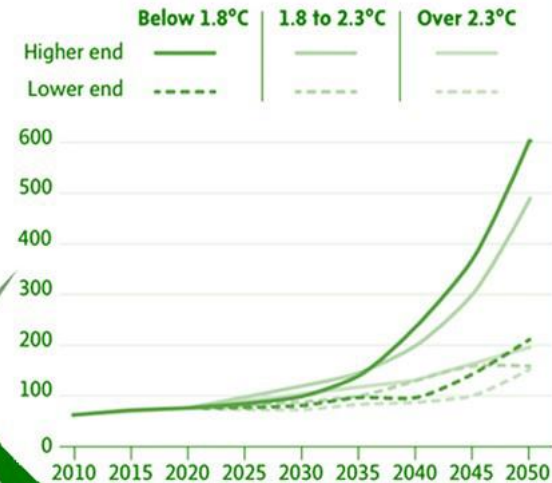
Source: Environmental Goals and Climate Change Reduction Act

Growth in the hydrogen economy

N.42

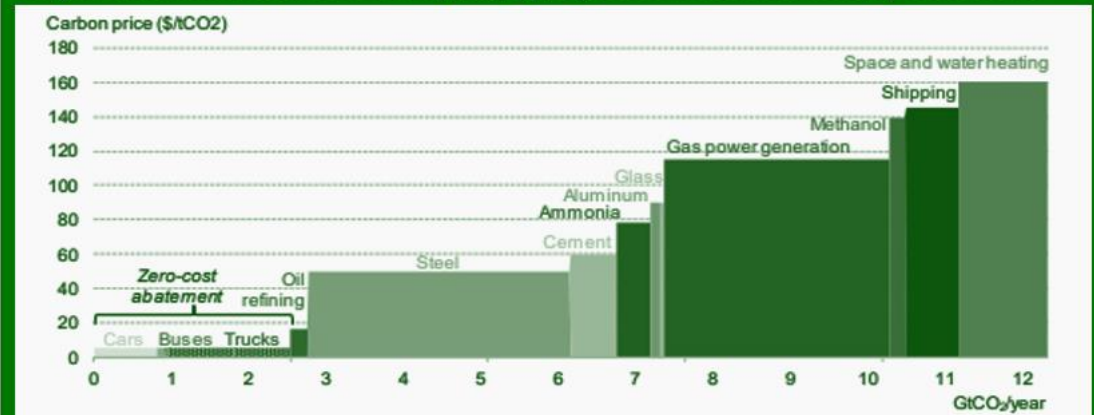
The momentum for green hydrogen produced using renewable energy sources like solar and wind is growing fast.

Range of hydrogen demand by global temperature rise scenario
Megatonnes of hydrogen



Green hydrogen can provide solutions for “hard-to-abate” sectors where the transition to clean energy is either technologically or financially difficult. Hydrogen as a share of global energy usage is projected to vary from 7% to 24% by 2050. Opportunity exists in Nova Scotia to produce green hydrogen using offshore wind. Benefits of so-called “hydrogen islands” co-locating power generation, electrolysis, and ammonification include reduced nimbysism and elimination of on land hydrogen pipeline infrastructure for seaport export.

Marginal abatement cost curve from using \$1/kg hydrogen for emission reductions, by sector in 2050



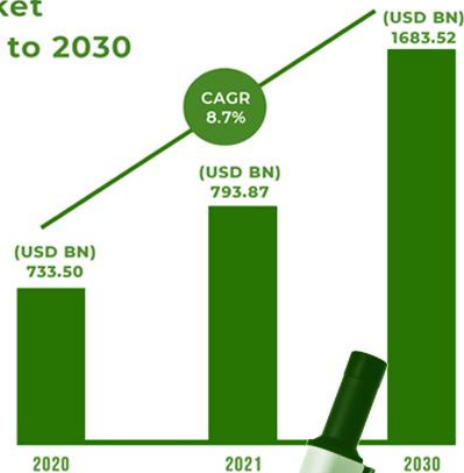
Sources: Bloomberg New Energy Finance. (2020). Hydrogen Economy Outlook Key Messages.; Burgess, J., Bowles, A. (2022). CIP plans large-scale hydrogen island in Denmark backed by 10 GW of offshore wind; PricewaterhouseCoopers (PwC)

More opportunities in the bio-economy

N.43

The bio-economy is defined as the economic activity associated with bio-based products and processes. It includes the use of resources from agriculture, forestry, fisheries and aquaculture, organic waste, and aquatic biomass.

Biotechnology Market
2021 to 2030



Increasing global demand for low carbon energy sources has seen an increased interest in and demand for biofuels. However, there are clear limits to how much biomass can be sustainably harvested.

Synthetic biology (synbio) is a multidisciplinary area of research that seeks to create new biological parts, devices, and systems, or to redesign systems that are already found in nature.

It is a science that redesigns organisms in a way that is useful for human life and could have a direct economic impact of \$3.6 trillion by 2040.



Sources: McKinsey; Energy Transitions Commission. (2018). Mission Possible Reaching Net-Zero Carbon Emissions From Harder-To-Abate Sectors By Mid-Century.; EIA. (2021). U.S. energy facts explained.