TOWARDS AN INFRASTRUCTURE RENEWAL STRATEGY FOR

NEW BRUNSWICK

Anna Robak & John McLaughlin

TME Working Paper
University of New Brunswick

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Why Infrastructure?

A bold, ambitious infrastructure strategy has the power to create wealth and improve quality of life for all.

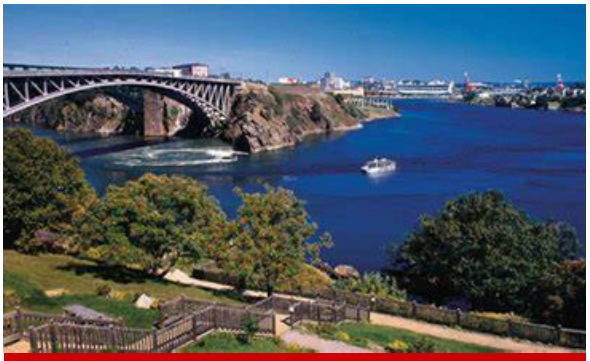
Infrastructure are the structures and services that make up our energy production and transmission, information communications and technology, built environment, and natural environment. They include hydropower generation plants, roads, bridges, schools, hospitals, water supply systems, telecom towers, power lines, wetlands, drainage ponds, and more. Traditionally, each class of infrastructure has its own organisation planning and managing it. But this single-purpose approach has caused too much waste, and too many unintended consequences.

Revolutionizing our current infrastructure paradigm can contribute significantly to re-engineering the economy, improving productivity, and strengthening our sense of community.

Building, maintaining and improving infrastructure are major economic activities in their own right. They further create spin-off opportunities such as consultancy, and through increase employment and business opportunity, rich communities of education, art, and leisure take hold.

Revitalized infrastructure can provide an essential platform for significant innovation - if we do it right.

We need an infrastructure agenda that is urgent and ambitious!



Infrastructure can transform economies and societies

We envision a New Brunswick in which all residents feel safe and supported to live full, rewarding lives with strong relationships and a sense of purpose. We want New Brunswickers to want to stay, build a business, or have a family. These elements are critical to a thriving, resilient economy and society. And we know that infrastructure –hard and soft – are critical to quality of life and a thriving economy.

Executive Summary

This discussion paper lays out New Brunswick's critical infrastructure issues and proposes bold, evidence-based approaches to leveraging infrastructure to improve quality of life and create wealth in the province.

The demand for bigger, more, and future-ready infrastructure is accelerating because of a rapidly changing climate, technology and energy landscape, an ageing population, and economic and political threats. If - and only if - we meet this challenge with innovation and ambition, will we have a leading economy and society. We will create wealth, improve quality of life, and be a unified force. Targeted investments in the physical structures and equipment that make up our energy, information communications and technology, built environment, and natural assets could bring in an additional $5-15 billion per year - and much more if we base our investments on these principles:

1. Technology investments can reduce the demand and cost of infrastructure, and increase productivity and innovation
2. Green investments create more jobs than “brown” jobs
3. Procuring from local companies builds wealth and capacity in New Brunswick
4. A focus on equity-deserving populations provides the greatest economic impact
5. Resilience to climate change and cyber attacks will reduce losses and increase innovation
6. There are multiple contributors to the same end goals, through infrastructure and softer services.
7. A single asset can contribute to multiple goals.
8. Inspiration, innovation and ambition to attract emotional and financial investment

What needs to change:

-Regulations to allow leveraging technologies, natural assets, and local resources

-First Nations infrastructure investments to create a platform for generating wealth

-A focus on health and joy in planning and design to attract and retain innovative New Brunswickers

-Planning, funding, and problem-solving structures that recognize and reinforce shared objectives across asset classes and levels and departments of government, non-profits, private sector, First Nations, and academia. Goals and contributions must be mapped out.

-Review performance of projects and initiatives to evaluate their full costs and benefits, and identify barriers to achieving full impact

-Research and pilots to test and validate impact

It’s time for a revolution that is bold, engages all New Brunswickers, and celebrates what is possible with a small and tight network – and one that recognises the need to always critically re-evaluate. We aim to engage all relevant decision-makers and influencers to commit to infrastructure that creates wealth and improves quality of life for all New Brunswickers. **Our strategy will improve health, social connectedness and natural environment, and spark innovation and productivity.**

Background

This discussion paper is part of The Deep Change Project (DCP), an initiative within the University of New Brunswick (UNB)'s Technology Management and Entrepreneurship (TME) program. Launched in 2012, with generous financial support from UNB alumni **Wayne and Cathy Beach**, its core mission is to contribute to building an integrated, strategic plan for the province in a time of deep economic, social and environmental change. The focus is on both the creation of wealth and deploying this wealth in support of strengthening the quality of life for all New Brunswickers.

DCP is described in detail in two eBooks *(McLaughlin & Hrabluk 2014; Hrabluk & McLaughlin 2018)* and led to the development of a graduate TME course **"Leadership in an Era of Deep Change".** The project has focused on the challenges and opportunities of strengthening the culture of innovation and entrepreneurship in the province. It has also influenced, and been influenced by, a series of provincial studies related to energy transition, the future of NB Power, hydraulic fracking, and healthy aging.

Introduction

New Brunswick is a province known for its natural beauty and people's hospitality. Our small size fosters strong connections and collaboration across institutions, allowing us to move initiatives forward quickly. Historically, New Brunswick has demonstrated leadership and creativity in various sectors, including technology, shipbuilding, geomatics, and healthcare. However, our leadership has often waned over time.

Today, we face numerous challenges: deteriorating infrastructure, a healthcare crisis, rising living costs, climate change, digital threats, energy transitions, and the need for reconciliation with Indigenous communities. Infrastructure, both physical and social, plays a crucial role in addressing these challenges. Many of our siloed infrastructure decisions actually exacerbate inequality by locating schools and hospitals far from communities. But three major issues have emerged:

1. **The vulnerability of our infrastructure to climate change, age, and technological obsolescence is increasing at an alarming rate.**
2. **Inequitable access to infrastructure, exacerbating social inequalities.**
3. **Independent and uncoordinated infrastructure planning.**

Our infrastructure is addressing symptoms rather than root causes of societal issues. To tackle these challenges, empower our institutions to address the systemic barriers currently exacerbated by existing infrastructure, that disproportionately impact First Nations communities, people with disabilities, people with lower incomes, and older adults. This involves considering all asset types and targeting investments to eliminate access gaps, optimizing infrastructure use through a systems approach, and addressing root causes rather than just symptoms. This paper calls for a strategic redistribution of investments to organizations capable of making significant improvements in health, economic productivity, social connectedness, and the natural environment.

As we cast around for inspiration for New Brunswickers seeking to navigate the stormy waters of the 21st century, it dawned on us that our search for models of resilience and determination should focus on the First Nations on this land. Buffeted by broad social and economic forces, displaced from their land and waters, ill-treated by colonial and national policies, First Nations endured, showing the kind of resilience New Brunswick needs in 2025.

Our province faces historic dislocation and must dig deep into the well of our collective love of this province to find the commitment, creativity and determination to create a new future. As we draw on the First Nations experience for ideas and resolve, New Brunswick can also seek a future based on real and sustained partnership with our First Nations friends and neighbours.

We can do much more with the resources we have, by coordinated responses to key goals, reviewing regulations to enable technology and natural solutions, investing in First Nations communities, focusing on health and joy, and enabling an innovative spirit.

New Brunswick spends 2X more per capita than Ontario maintaining roads and bridges, and our infrastructure portfolio is rapidly growing & deteriorating.

Trends affecting infrastructure demand and supply

Several trends will affect the need for, cost of, and resilience of, providing infrastructure services. They include a growing infrastructure base with a rapidly deteriorating condition; a changing climate; rising costs; new digital realities; and the energy transition.

Existing infrastructure

New Brunswick has more infrastructure per capita than any other province (Figure 7 & 8). Compared to Ontario on a per capita basis, we have 50% more roads, and spend nearly twice as much maintaining roads and bridges. While we rethink our new infrastructure paradigm, this infrastructure must continue to be maintained, or it presents safety risks to the public.

Thus, in terms of condition and costs compared to other provinces, we have higher liabilities into which we are locked in. However, when we look at trends over time, the performance of our infrastructure over time is less clear. For example, the percentage of assets in poor to very poor condition has been ***decreasing*** over the past 30 years (Figure 7 & 8), and between 2020 and 2022, the value of assets in New Brunswick has increased by 27%. However, the percentage of assets in very good condition has dropped by 22% in just two years. A deep analysis of New Brunswick infrastructure condition is needed.

Finally, the "state" of our infrastructure should be considered not only in terms of condition, but also in its ability to support thriving residents and businesses. For example, we know that there is some infrastructure, such as housing, that we don't have enough of, to meet New Brunswickers' basic needs. We are not only concerned with our existing infrastructure; there are many climate, societal and economic changes affecting the demand for, and future costs of, our infrastructure.

It is time to decide what infrastructure we need for a 2040 economy.

Increased cost of inputs. The cost of labour, materials, land and insurance will increase. The cost of materials production will increase with forest fires and depleting natural resources. Supply chains will be disrupted more frequently due to storms. The cost of labour will increase with increasing chronic disease, and as more potential employees take time off to care for ageing parents and people with disabilities, or to manage the after-effects of flood and storm damage at home. The cost of construction will also increase due to the need to work around hotter weather and more frequent storms and flooding – and to insure against them.

Population health and age

An aging population will increase the need for healthcare facilities.

New Brunswick has 20-50% higher rates of chronic disease, disability, and poor mental health than the Canadian average (New Brunswick Health Council, 2024) (see Figure 1). New Brunswickers spend over $6 billion per year in healthcare - $3.8b for public sector healthcare services (Finance and Treasury Board, GNB, 2024) and over $2.0b privately (e.g., insurance, out of pocket) (New Brunswick Health Council, 2023). Further, the proportion of New Brunswickers over 65 years old is expected to increase by 33% in the next fifteen years, adding a further demand on an already stressed healthcare system (Statistics Canada, 2024).

Many of these older adults can only find adequate treatment and care facilities outside of the communities in which they have built strong social networks. This change as they age results in a reduction of support, social connectedness, and mental health. This shift may be even more keenly felt amongst First Nations, who may have experienced a stronger sense of community (Assembly of First Nations, 2023). Greater efforts to help older adults age in place require infrastructure planning and investments.

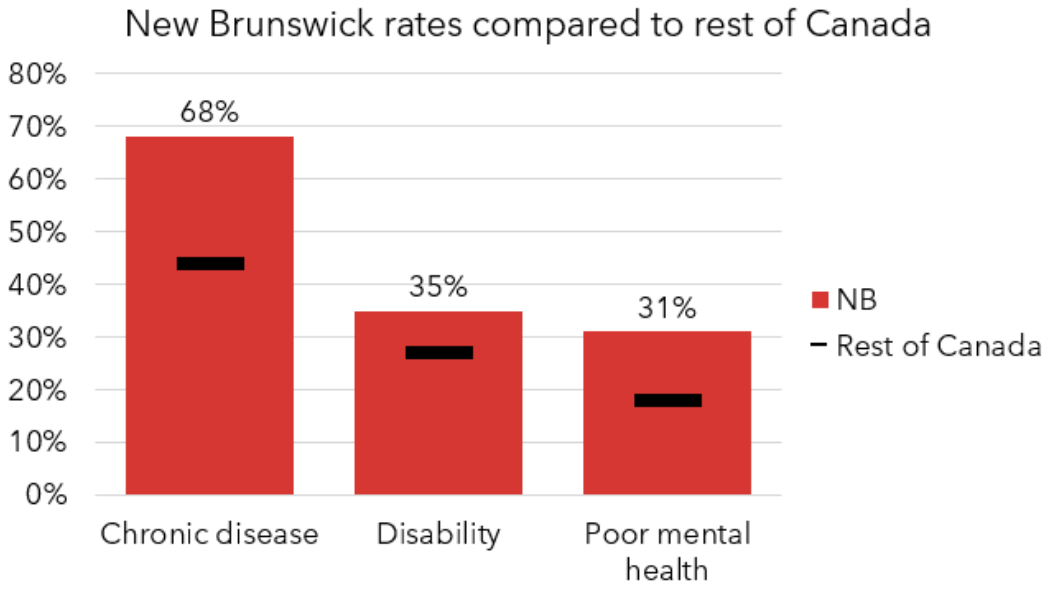


Figure 1. Rates of chronic disease and disability in New Brunswick compared to rest of Canada

Source: Compiled from StatsCan data

Indigenous communities' infrastructure

First Nations communities have poorer quality infrastructure services, including year-round boil water notices, inadequate healthcare facilities, roads and schools in poor condition, poor quality and overcrowded housing, and poor digital connectivity. And First Nations populations are growing faster than non-First Nations (StatsCan, 2023). The Assembly of First Nations (2023) estimated investments of $12 billion in First Nations communities in Atlantic Canada, to eradicate inequality by 2030. If the number for New Brunswick is proportional to First Nations populations, it is in the order of $3 billion. The investments are aimed at providing equivalent quality and quantity housing, water, and health and educational facilities; and the skills required for First Nations people to operate, maintain, and make decisions about their own assets.

A multi-billion dollar backlog in infrastructure in First Nations communities.

Energy transition and climate change mitigation

There is a federal requirement for all federal and provincial agencies and municipalities to be net zero by **2050.** Current estimates to meet these requirements, including bringing facilities into compliance, clean energy investments, and research and development, across Canada over the next three decades is in the order of $2 trillion (Government of Canada, 2024). Electricity demand is expected to increase by **70%** in the next twelve years, and the energy mix will change through a reduction in coal and increase in natural gas, nuclear, wind, solar, and biomass (Figure 2) (GNB, 2023). These shifts will require substantial investment in new energy production and distribution infrastructure – and in the skills to design, maintain, operate, and make decisions about these investments. The opportunities to innovate, create new businesses, and attract new investment, are significant.

In New Brunswick, this goal is driving substantial shifts technological change enables a new paradigm for energy production and consumption – one in which groups that were previously either suppliers or consumers, can become both. This shift increases demand for more localised energy production, and may take the load off centralised production.

Technology already affords opportunities to significantly defer large capital expenditures and reduce operating costs, but we're not leveraging the capabilities; regulations that don't consider contemporary technologies.

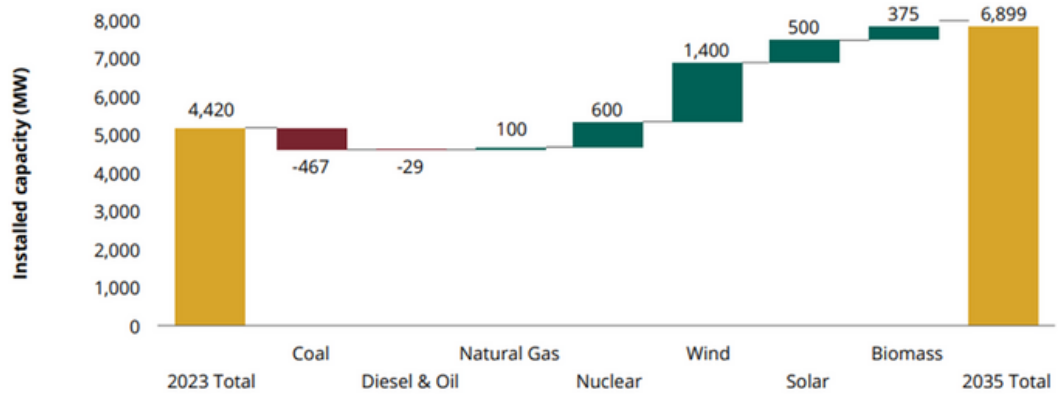


Figure 2. Changes in energy production sources in New Brunswick, 2023-2035 (source: GNB (2023))

Adapting to climate change

New Brunswick is expecting hotter weather, increased flooding, and increased frequency and severity of storms, based on data from Climate Atlas. A changing climate will increase infrastructure costs in three dimensions:

- **Shorter life.** Increased heat, for example, will melt pavements, shortening their lives. The Financial Accountability Office of Ontario (FAO) estimates that a road's expected life will reduce by 15-22%, increasing retrofit costs by 60% (WSP, 2023). Shorter asset lives present more health and safety risks to the public, and will require that a greater portion of New Brunswickers' income is directed at rehabilitating infrastructure.

- **Increased demand.** A changing climate will require infrastructure with greater capacity and strength to withstand events. Increased heat will require larger water reservoirs to withstand longer dry periods. Increased rainfall will require larger culverts and stronger embankments to keep drainage and transportation infrastructure operating. Culvert retrofit costs could increase by 60% (WSP, 2023). Meeting this demand will further increase costs to ratepayers; not meeting it will present major health and safety risks, and economic burden to households and businesses.

Climate change will increase the cost of some infrastructure by 60%.

Labour availability

New Brunswick's construction sector is short 2000 workers, which is hindering our ability to meet housing needs and complete other construction projects in time to meet New Brunswickers' needs (GNB, 2024). Increasing demand for housing, paired with 8400 retirements over the next eight years, is expected to further delay construction of new housing and schools.

A shrinking labour market will delay construction of much-needed homes, healthcare facilities & schools.

Accessibility

Under the Accessible Canada Act (Government of Canada, 2019), and New Brunswick's Accessibility Act (GNB, 2024), all Canadian federal facilities and New Brunswick provincial facilities must be accessible to people with disabilities by 2040. The cost of providing access, and the cost of not providing access, have yet to be estimated.

Digital disruption

Artificial Intelligence (AI) and the Internet of Things help automate, ensure the quality of, and predict future states of infrastructure. New data offers insights that allow us to "revitalize" and get more out of existing Infrastructure. They are becoming embedded in all our infrastructure design and operations. The digital technologies, or smart "Operational Technology" (OT) market, is expected to quadruple globally from 2020 to the early 2030s (Placek, 2022).

However, the downside of digital includes increased emissions, water consumption, and vulnerability to attack.

By 2027, the AI industry could consume as much energy as the Netherlands (de Vries, 2023; Kleinman & Vallance, 2023). It will also consume more freshwater; Microsoft's water consumption increased by 60% in just two years, between 2021 and 2023.

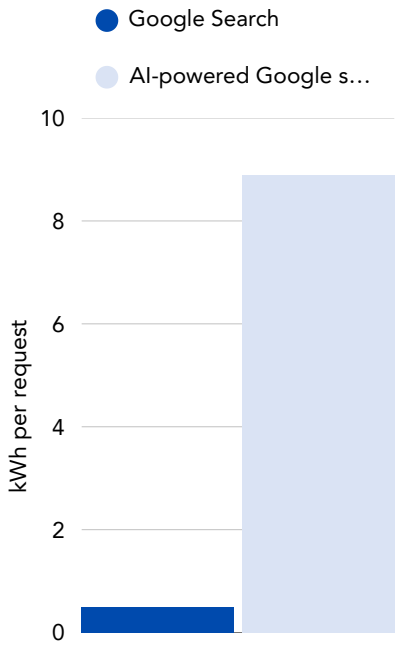


Figure 3. Energy consumption per AI-powered request compared to a standard Google search (de Vries, 2023)

Digital technology could reduce demand for infrastructure through optimisation and behavioural nudges.

This reduction will be offset by energy and water required to fuel digital tasks, and the need to protect critical infrastructure from attack.

The adoption of digital technologies also exposes our data and critical infrastructure to attack. In 2023, cyber attacks cost the Canadian economy over $4 billion in damages (Petrosyan, 2024), and $10 billion in cybersecurity protection measures. They are resulting in the loss of essential services at hospitals, revealing sensitive information, and destroying organizations' data (Canadian Centre for Cyber Security, 2024). In Newfoundland in 2021, a cyber attack delayed thousands of medical procedures (Canadian Centre for Cyber Security, 2024). In 2024, 12% of Canadian healthcare facilities, 16% of utilities, and 19% of educational facilities, had already reported a cyber incident (Statistics Canada, 2024).

"Back of the envelope" summary of anticipated infrastructure cost increases
These trends suggest additional infrastructure-related investments of at least $4.8 billion per year over the next twenty years, as shown in Table 1. These estimates are highly conservative due to large unknowns.

Trends	Estimated additional *annual* infrastructure investment required over the next 20 years (*billions* of dollars)
Climate change mitigation	**+2.2 [1]**
Climate change adaptation	**+1.0 [2]**
Population health and age	**+1.1 [3]**
Truth and reconciliation	**+0.5 [4]**
Digital disruption	***+0.28 [5]***
Accessibility	***Unknown***
Energy transition	***Unknown***
Labour availability	***NA***
Total	**+4.8**

Table 1. Additional infrastructure investments required, given trends

[1] Based on $1 trillion for all of Canada, pro-rated to NBpopulation, over the next 20 years
[2] Based on extrapolation of City of Fredericton's capital budget ($110m, from Government of NB (2021)) to all of New Brunswick (population 10x), and estimated capital budget for all NB municipalities ($620 m Government of NB (2022)), plus provincial spend of $1.2b (Poitras, 2024), applying 60% increase
[3] Based on extrapolation of current provincial healthcare spend, applying 33% increase to account for older adult population
[4] Based on estimated $3 billion pro-rated for NB's First Nations population, over the next 6 years, as per the Assembly of First Nations
[5] Based on $14billion of cyber attacks and cyber protection across Canada, pro rated for the New Brunswick population. Does not include changes to foundational infrastructure, IoT sensors, broadband, or other telecommunications infrastructure". Then this one would come after truth and reconciliation

Public infrastructure could reduce 20-30% of chronic disease, but only 4% of the provincial budget is dedicated to public health (preventive)

The economic and societal impact of infrastructure – and what's possible

Infrastructure impacts our health, the cost of living, and our sense of social connectedness. But it also incurs costs and risks.

Business growth and jobs / scale

Infrastructure development attracts investment. However, the scale must be "right" – large enough to attract investment and usage interest. At the same time, projects must be procured at the right scale for New Brunswick businesses to be able to not only participate, but lead. Thus, there is a balance to strike to ensure overall, long-term economic benefits to the province.

Operations and maintenance liabilities

Once infrastructure is built, it incurs long-term liabilities - ongoing annual costs to operate and maintain, and any associated spillover costs and benefits. Even when infrastructure is retired, there are costs associated with decommissioning the facilities. A common mis-step is for asset owners to budget for capital expenditures, but not to account for the additional operating and maintenance expenditures that will be required to maintain new facilities.

Health

20-30% of chronic disease, and 44% of dementia and Alzheimer's (Rovio, 2005), is due to inadequate physical activity and similar lifestyle factors (Alberta Health Services; Medical Officers of Health in the GTHA, 2014). The built environment can increase the likelihood of getting adequate physical activity by 60% (Ohri-Vachaspati, 2015). Yet just 4% of our provincial health expenditure is targeted at public health – promoting healthy lifestyles and preventing illness and injury (New Brunswick Health Council, 2023). What if our infrastructure and associated services were designed to cut all chronic disease that is due to inadequate physical activity?

In addition to preventive physical health, infrastructure influences our mental health and sense of social connectedness, and provides transportation and digital connections to healthcare facilities; digital infrastructure for effective and efficient treatment; and buildings and equipment for healthcare facilities. Well-designed healthcare facilities have been shown to reduce recovery time, medication costs, injuries, and staff turnover by 20% (Walch, et al., 2005; Ulrich, 1984; Beauchemin & Hays, 1996).

Infrastructure can reduce the healthcare burden
High-level estimates suggest we could reduce the healthcare burden (reduce healthcare costs AND improve health) by up to

(1) **20%** by targeting investments in public infrastructure and services that support **preventive health** (parks, walkable neighbourhoods, transit, active transportation) [5];
(2) **12%** by investing in healthy, **affordable homes**[6];
(3) **2%** by providing housing to people without homes[7];
(4) **10%** by investing in healthcare facilities that result in **shorter stays** and less medication (Ulrich, 1984; Beauchemin & Hays, 1996; Walch, et al., 2005), reduce staff sick time and turnover, and reduce energy consumption[8];
(5) **2%** by providing access to medical care, through transportation and/or virtual connection to medical checkups, diagnosis and treatments.[9]
(6) **??** by investing in healthcare and preventive health measures for First Nations people

In addition to reducing the healthcare burden, we could create wealth and attract more medical, public health, planning and engineering professionals by

(1) Training medical professionals in social prescribing – recognising built environment factors that need to change to improve their patients' health
(2) Investing and collaborating innovatively between levels of government, and between government departments, and between government and First Nations, with proven results of better health
(3) Creating opportunities for businesses to participate more fully in public health and healthcare

[5] Well-planned infrastructure can reduce chronic disease by 20-30%. More accurate estimates of the direct impact of public infrastructure on healthcare costs remain to be researched.
[6] The economic burden of poor and unaffordable housing in Canada is estimated at $46.2 billion (Canadian Centre for Economic Analysis, 2024). Pro-rated directly to New Brunswick, this equates to $852 million.
[7] The cost of homelessness in Canada has been calculated at $7.5 billion (Statistics Canada, 2024). Pro-rated directly for New Brunswick, this equates to $138 million.
[8] An unpublished study by WSP in the US compared the results of three hospital redesigns and found that the new facilities reduced energy consumption by 15-20%; increased staff engagement by five percentage points, with a calculated benefit of $300,000 per year; reduced turnover by 3.5%, for a $1.1m annual savings; reduced illness and injury by 8%, for benefits of $1.5m per year.
[9] The economic burden of health inequalities in Canada's healthcare system is $6.2 billion per year (Public Health Agency of Canada, 2016). Pro-rated directly for New Brunswick, this equates to $114 million.

Cost of living

The cost of living is high in New Brunswick, and increasing (Figure 4 and Figure 5). The median New Brunswick household dedicates 30% more of its budget to transportation than other Canadian households (Statistics Canada, 2013). The cost of housing and transportation are rising even more rapidly; between 2021 and 2022, the cost of housing increased by 34% (CBC News, 2022). The cost of energy to heat and cool homes is also increasing, and the increase in the number of hot days will further increase these costs. 26% of New Brunswick households already experience energy poverty (Efficiency Canada, 2023). First Nations communities invest an even higher proportion of their budget into housing and transportation. What if our infrastructure and associated services were designed to reduce the cost of housing, food and transportation – or to increase wealth to be able to pay for them?

New Brunswickers dedicate 19% of their household budget to transportation.

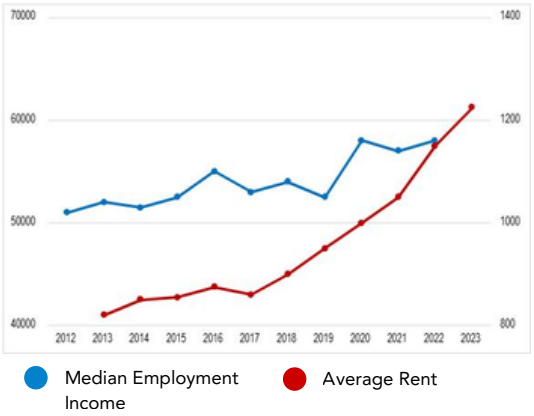


Figure 4. Income vs average rent (3-bedroom+ apartment, October 2023)

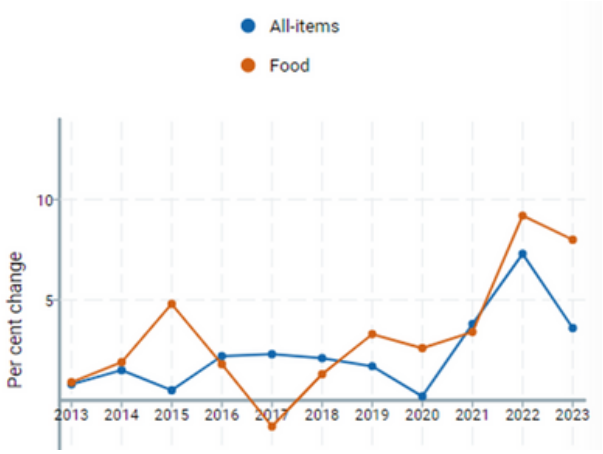


Figure 5. Consumer Price Index – Food

Source: New Brunswick Health Council (2024)

Transportation gaps restrict residents' ability to find employment opportunities in 35% of dissemination areas in Canada's major cities (Allen & Farber, 2019). With a reduced cost of living, more people can be gainfully employed, and access the education they want.

Infrastructure can reduce the cost of living

We could reduce the cost of living for the most burdened New Brunswickers by:

- Providing public and active transport within 400m of homes, schools, and workplaces
- Locating hospitals, schools within walking and rolling distance to residential areas
- Ensuring employers are equipped to attract and retain people with disabilities
- Providing mechanisms for homes to be well heated, cooled, and ventilated

Active transportation facilities can significantly increase retail sales. Public transportation can have greater economic impacts than investing in infrastructure for private vehicles.

These changes to the built environment not only improve quality of life, but create wealth, by:

- Increase retail sales by up to 400% by providing pedestrian plazas and more active transportation routes in city centres (Volker & Handy, 2021; Arancibia, et al., 2019).
- Giving access to employment to lower-income earners: Every dollar paid to a lower-income earner is associated with a Marginal Propensity to Spend of $0.85, compared to $0.6 for higher income earners (Statistics Canada, 2021).

Inclusion and social connectedness

The way we design transportation systems and neighbourhoods for inclusion – "complete streets", can promote social interaction. Homes are close to the street, sidewalks on both sides, and gathering areas at the backs or properties, meaning there are always eyes on the street, for increased safety, and also that residents are more likely to see and interact with each other.

Other considerations are to offer options for residents to age-in-place. The ability to live in the same neighbourhood until the end, or nearly so, helps people feel connected to, and supported by, their local community. Similarly, making homes "visitable" creates more opportunities with people with disabilities to connect freely with friends and family.

In addition to a built environment that encourages physical activity, other types of infrastructure stimulate inclusion. Information and Communication Technology (ICT) is one critical element. The digital environment allows people to participate more fully in commerce and social interaction, and is a more accessible alternative for people with some types of disabilities. But leveraging this infrastructure is as much about **skills** as about infrastructure. As Eaves and Sandman (2023) put it: "Society-wide, digital capabilities are essential to participation in society and markets as a citizen, entrepreneur and consumer in a digital era." Eaves, Mazzucato & Vasconcellos (2024) emphasise the human rights aspect of digital: "An individual that does not have the capabilities to participate in a digital society, is excluded from opportunities and loses their freedom."

Infrastructure can improve social connectedness by:

-Requiring "complete streets" designs
-Measuring social connectedness factors in each community and mandating equity across all types of communities

Infrastructure can create wealth by:

- Providing adequate workplace accommodations for people with disabilities would bring an additional $1.97 billion into the New Brunswick economy - $1.4 billion of which is valued as net new income (Tacit Elements, 2020).

- Providing good quality, fit-for-purpose infrastructure in First Nations communities could bring an additional $13 billion into the New Brunswick economy[10] (Assembly of First Nations, 2023).

Business models

New infrastructure paradigms in energy and information communications technology enable new business models – platform business models that provide opportunities for all New Brunswickers to participate as suppliers as well as consumers.[11]

"Back of the envelope" summary of potential wealth creation

These opportunities suggest additional infrastructure-related investments of could produce between $5.2 billion (Table 2) and $15 billion[12] in net benefits to the New Brunswick economy, and 45,100 jobs. These estimates are highly conservative due to substantial unknowns and potentially exponential multiplier effects.

Opportunity	Estimated net *annual* benefits from infrastructure investments (*billions* of dollars)
Employment access for people with disabilities	**+2.0 [13]**
Closing First Nations infrastructure gap	***+1.8***
Preventive health investments	***+1.4 [14]***
Settling First Nations land claims	**TBC**
Inclusion and social connectedness (other)	***TBC***
New business models	**TBC**
Reducing cost of living	***TBC***
Total	**+5.2-15**

Table 2. Estimated annual net benefits from infrastructure investments

[10] The Assembly of First Nations (2024) estimated benefits of $635 billion over the next seven years, if adequate infrastructure investments are made. New Brunswick's First Nations population represents approximately 2% of Canada's. A straight-line interpolation was made as an estimate for the benefits to New Brunswick. Divided over seven years, this is $2 billion.

[11] Discussion paper by Minard, O'Hara, Wasson (2024): "A thought paper considering a platform business model to underpin energy system futures resulting in regional economic prosperity".

[12] This upper end is based on estimates by The Centre for Spatial Economics that every million dollars of infrastructure investment results in 9.4 jobs created, and between 2.5 and 3.8 million of GDP (Assembly of First Nations, 2023; The Centre for Spatial Economics, 2015).

[13] From Tacit Elements (2020)

[14] Based on reducing chronic disease by 20%, assuming a straight-line impact on $7 billion provincial and private healthcare expenditures in the province

An Infrastructure Perspective

Hard and soft infrastructure

Infrastructure includes both hard and soft infrastructure. Hard infrastructure includes built environment, such as transportation systems and buildings; energy infrastructure; and information & communications technology (ICT). These hard infrastructures are a critical foundation to creation of wealth and quality of life, as shown in Figure 6.

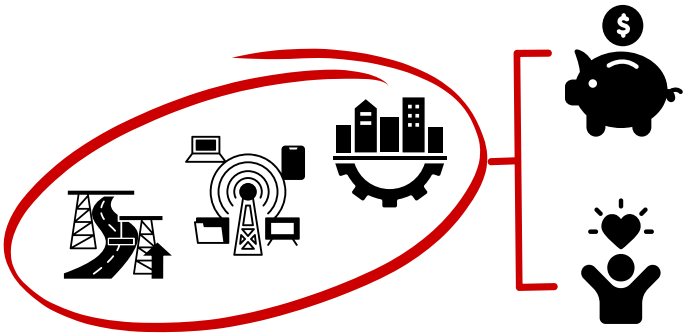


Figure 6. All infrastructure classes contribute to all outcomes

Soft infrastructure includes the institutions - the laws, practices and organisations - that both rely on hard infrastructure to function, and are required to maximise the value of the hard infrastructure. At the heart of soft infrastructure is the underlying culture – the shared values, goals and behaviours – that determine how we do things.

Infrastructure principles

It is useful to consider infrastructure principles not only because of their foundational role in creating wealth and improving quality of life, but also because they offer new ways of thinking, if we broaden the principles to the way we invest across all hard and soft infrastructure. Those principles are as follows:

-Lifecycle (preventive). Focuses on estimating costs and optimizing investments throughout an asset's life by balancing performance with "whole of life" costs. Early investment extends asset life and maintains higher performance.

-Portfolio. Extends the lifecycle principle to an entire portfolio of assets, optimizing funds across asset groups and classes.

-Dependencies / Network / Systems thinking. Considers how assets and users work together to define user experience. One failed asset can disrupt an entire route, adding time and cost. This concept includes incorporating softer services to meet objectives, such as housing near parks or transit stops.

-Criticality and resilience. Classifies assets by criticality to provide resilience to the most critical services. Ratings are based on economic, social, reputational, and environmental impacts upon failure.

-Spillover effects. Investment in one area influences another. The aim is to understand and minimize negative spillovers while leveraging positive ones through co-funding arrangements.

-Benefit cost analysis. Evaluates full benefits to society compared to total costs. It has weaknesses, such as giving more weight to easily monetized costs and benefits.

-The Golden thread. Refers to the overall objectives of an agency and how each component's performance contributes to that higher-level objective.

-Infrastructure "deficit". Can be estimated based on bringing all infrastructure to a "good" condition or meeting a certain level of resilience. Condition may not always indicate performance.

Current state of our infrastructure

Our infrastructure stock will require substantial investment to (1) remain resilient in the face of increasing climate pressures; (2) leverage, and protect ourselves from, digital technologies; and (3) meet new demands, such as enabling new relationships between energy providers and consumers.

In First Nations communities across Canada, only 20 of 748 communities interviewed through the Assembly of First Nations study (2023), have the three infrastructure elements of fibre backbone. The digital infrastructure gap in First Nations communities across Canada is estimated at $3 billion.

Reducing the costs of infrastructure

There are several ways of both increasing wealth, and reducing the whole of life costs of our infrastructure, that are worth considering in New Brunswick. They include:

-Leveraging natural assets. Some types of infrastructure can be supplemented, or even largely replaced, by functions from the natural environment. Forests and wetlands, for example, can be leveraged to treat wastewater, saving millions or billions both in the construction of new infrastructure and in the long-term operation and maintenance – as well as in GHG emissions. Figure 7 shows that the whole of life costs of implementing natural solutions can be several lower higher than the costs of traditional infrastructure (shown as "benefits" in the figure).

Figure 7. Benefits of natural asset solutions compared to traditional infrastructure

Image adapted from Hanson, Talberth & Yonavjak (2011), with additional sources: National Round Table on the Environment and the Economy (2011)* "Benefits" are difference between cost of traditional infrastructure and green

-Leveraging behavioural science. Behavioural science techniques have been shown to reduce demand for infrastructure in solid waste, water, wastewater, and energy. Techniques such as sharing information about consumption or production have been successful in reducing consumption by 10-20% (Lopes, Antunes, & Martins, 2012; Ek & Söderberg, 2024), and deferred the need to invest in infrastructure by ten years or more (Smith, McDonald, & Wilson, 2009).

-Leveraging technology. In addition to supporting our behavioural science aims through IoT sensors and real-time information, technology can substantially reduce the costs of construction. BIM, for example, has been shown to reduce costs by between 8 and 15%, because the information reduces uncertainties and risks, resulting in less risk contingency pricing, less arbitration, and less re-work (World Economic Forum, 2016). In the US, 6-9% of construction costs are due to worker injuries. Wearable technologies can monitor fatigue and real-time location, reducing the likelihood of injury. In conjunction with other real-time location systems, technology can reduce the costs of labour by 60%, and the overall costs of construction by 10%, by having people, machinery and equipment at the right place at the right time, just in time (reducing the need to stockpile) (World Economic Forum, 2016).

-Accounting for future trends. Preparing in advance for future trends such as climate change can extend the useful life of assets, strengthening them to withstand future heat and precipitation. Overall, this approach reduced long-term costs.

-Innovative and collaborative funding models. Multiple stakeholders can collaborate towards a common aim, such as reducing the health burden. Municipalities invest in parks, for example, and the Health Department could too, to reduce their own capital and operating costs in the long term. Private developers, employers, and designers, could contribute to inspiring, health-promoting spaces.

-Procuring locally. Research by Dr Penny Burns in Victoria, Australia, showed that 20-50% of the money invested in infrastructure left the state, and often national, economy. The type of work mattered; for new builds, only 50% of the payments stayed in state; for renewals, 60-70%; and for maintenance, 80% stayed in state[15]. We don't have the numbers for New Brunswick, but we should. And then we should create procurement policies that create more wealth and opportunity in New Brunswick.

The costs of infrastructure can be reduced by incorporating:
- Natural assets
- Behavioural science
- Technology
- Future trends
- Co-funding / multipurpos

Unlocking the economic and social benefits of infrastructure

Every million dollars of infrastructure investment creates 9.4 jobs, and between 2.5 and 3.8 million of GDP (Assembly of First Nations, 2023; The Centre for Spatial Economics, 2015). However, overall, long-term returns depend on who benefits. Improving services to populations that are already well served by infrastructure, can have marginal, and sometimes negative, effects on GDP Cascetta et al (2020). Such was the case in Italy's investments in higher speed trains.

A critical way to unlock the economic and social benefits of infrastructure is to benefit the population segments that stand to gain the most from infrastructure investments; they contribute the most to the economy once these investments are made. These populations include First Nations, people with disabilities, low-income households, older adults, and immigrants.

Settling First Nations land claims would be a significant step towards unlocking economic benefits of infrastructure. It would provide the much-needed capital for First Nations communities and businesspeople to invest in their communities, providing improved employment opportunities, healthcare, education, and hope.

Here are some selected New Brunswick success stories of creating wealth and improving quality of life through investments in hard and soft infrastructure:

> *SOAR Professional Services is an Indigenous engineering, environmental and planning consultancy that specialises in Indigenous infrastructure and economic development. SOAR is creating wealth and capacity in Indigenous communities. Their work braids Indigenous ways of knowing with science-based methodology.*

Another approach to creating wealth and improving quality of life is to support local procurement, by funding innovation and focusing on skills development.

> *One example in New Brunswick is the East Coast Waterways (ECW Inc), which has garnered the support of the business community and environmental organisations, to improve environmental, economic and social sustainability. Its infrastructure-related projects have included a village indoor farm to increase local food security, a carshare program of electric vehicles to reduce GHG emissions and reduce transportation costs for its villagers.*

Another example is local entrepreneur Keith McIntosh, whose firm PLATO Testing provides technology and digital services around New Brunswick and beyond, developing digital skills and providing employment opportunities for New Brunswickers.

> *Keith found that he would train his employees to have excellent digital and technology skills, but that despite his best efforts to retain them, they would eventually leave to another province. When the Truth and Reconciliation Commission's report was released, he realised there was one segment of the population who wanted to stay home and invest in their own community: it was the Indigenous employees. From that moment of realisation, he began to focus on recruiting and retaining Indigenous employees. The implications have been more highly skilled New Brunswickers in the digital sector.*

Framing an Agenda

The need for reform

Our healthcare system is failing New Brunswickers; it is based on reactive principles rather than proactive, and even from a reactive perspective, it is ineffective. Wait times for diagnosis and treatment result in unnecessary early deaths and poorer quality of life.

Our social institutions are failing too. Fewer New Brunswickers feel a sense of belonging to their local community; fewer are donating to charities; and only 50% feel they have very good mental health (GNB, 2024).

First Nations communities continue to suffer from chronic underinvestment. In these communities, rates of chronic disease and disability are higher than in the rest of the population; poor housing and water supply systems exacerbate health challenges; and poor transportation and telecommunications systems exacerbate the ability to work and gain income.

We are overdue for a deep reform. There has been little productivity increase in decades (New Brunswick Institute for Research, Data and Training (NB-IRDT), 2020), trust in government has plummeted, costs are rising, big tech and private capital are threatening our privacy, security and equality, and climate change is accelerating the need to rebuild our infrastructure and make it more resilient.

Considering the whole system

If we continue to address the "parts" individually, we will miss important opportunities to create greater impact and reduce costs. Consider what is lost when, as in the current situation, these parts are conceptualised and funded by a single stakeholder:

Recreation, health and environment example: Municipal parks offer a space for young and old to socialise and be physically active. They are funded by municipalities. But they also provide a strong mechanism for reducing chronic disease; mitigating flooding; and capturing carbon. Despite the fact they play a strong role in reducing healthcare costs and reducing flooding damage, departments of health and environment, and insurance companies, are not involved in their planning or funding. What impact could we have with re-imagined parks?

Airports example: Our regional airports attract relatively little capital due to their size. A larger - perhaps more centralized - airport, would attract more capital, more businesses, and create the demand for more innovative inter-regional transportation options.

How we know it's achievable

Deep cultural change is possible. Here's how we know: we've done it before.

1940s.

In 1943, New Brunswick established a Committee of Reconstruction. The committee sought widespread ideas on how to rebuild the province after the Second World War (Prince, 1944). The aims were to improve New Brunswickers' quality of life and the economy. New social infrastructure was built for a modern, middle-class economy, by increasing employment opportunities and wages; improving educational facilities for a more educated workforce; and improving social and welfare services to support New Brunswickers' well-being (Steel, Heather, 2006). In addition, engineering consultancies like ADI and Crandall Engineering began to form and flourish.

1960s

In 1962, New Brunswick underwent a radical restructuring of the local and provincial governments. This restructuring was the outcome of the Royal Commission on Finance and Municipal Taxation, led by Edward Byrne. The initial purpose of the commission was to investigate ways of reducing financial stress on municipal governments, and the changes included re-allocating responsibilities of various functions from local to provincial government, including education, justice, public health services, and welfare; unconditional grants to cover municipal local services costs; a uniform real estate tax; and a large increase in provincial sales tax. The overriding principle, embodied in the Program for Equal Opportunity, was that minimum service standards should be available for all citizens, regardless of where they lived (UNB Libraries, 2023). The changes were championed by Premier Louis Robichaud, and radically improved the lives of many New Brunswickers (Le Devoir, 2005).

How we know it's achievable

Deep cultural change is possible. Here's how we know: we've done it before.

1980s & 90s.

Frank McKenna, Premier of New Brunswick from 1987 to 1997, played a pivotal role in transforming the province to a national and international leader in digital and IT. There was a major focus on technology and innovation as a driver of economic growth, with an emphasis on the IT sector. This focus manifested through (1) heavy investment of a robust telecommunications network, which (2) attracted tech companies and fostered a digital economy; and (3) educating New Brunswickers to leverage IT (Marsh & Kucharsky, 2008). As a result, New Brunswick's economy diversified and became more resilient; startups and high-paying jobs were created; and New Brunswickers were more educated and well-positioned to leverage modern technologies.

Each of these initiatives took great political courage. They faced substantial public (and private sector) opposition due to the scale of change and the costs. But the improvements were dramatic and mostly positive.

However, all three waves of changes were flawed, leaving behind problems that were never adequately addressed. Most notably, that the changes were treated as one-offs, as final solutions. It was taken for granted that the "right" change had been made. There was no roadmap to continue to build on, and no feedback mechanism in place to monitor the performance of the decisions that had been made. It's time for another revolution – one that sticks.

There are examples of radical, lasting behavioural change from other countries. For example, some European countries as more bicycle- and pedestrian-friendly.

We often assume it's just in their culture. But Copenhagen, Denmark, is an example that has reinvented itself from a car-focused transportation culture, in the 1960s, to a bike-focused one. The transition was not without challenges. Retailer support for the project started at 33% in 2008, but grew to 57% after implementing a pilot (Catinét Research, 2008). After the pilot was completed in 2015, 57% of businesses supported it. This shift shows the power of pilots.

Elements of our plan

Infrastructure is an essential foundation for improved health, economy, and society. With that understanding, here's how we will develop our plan:

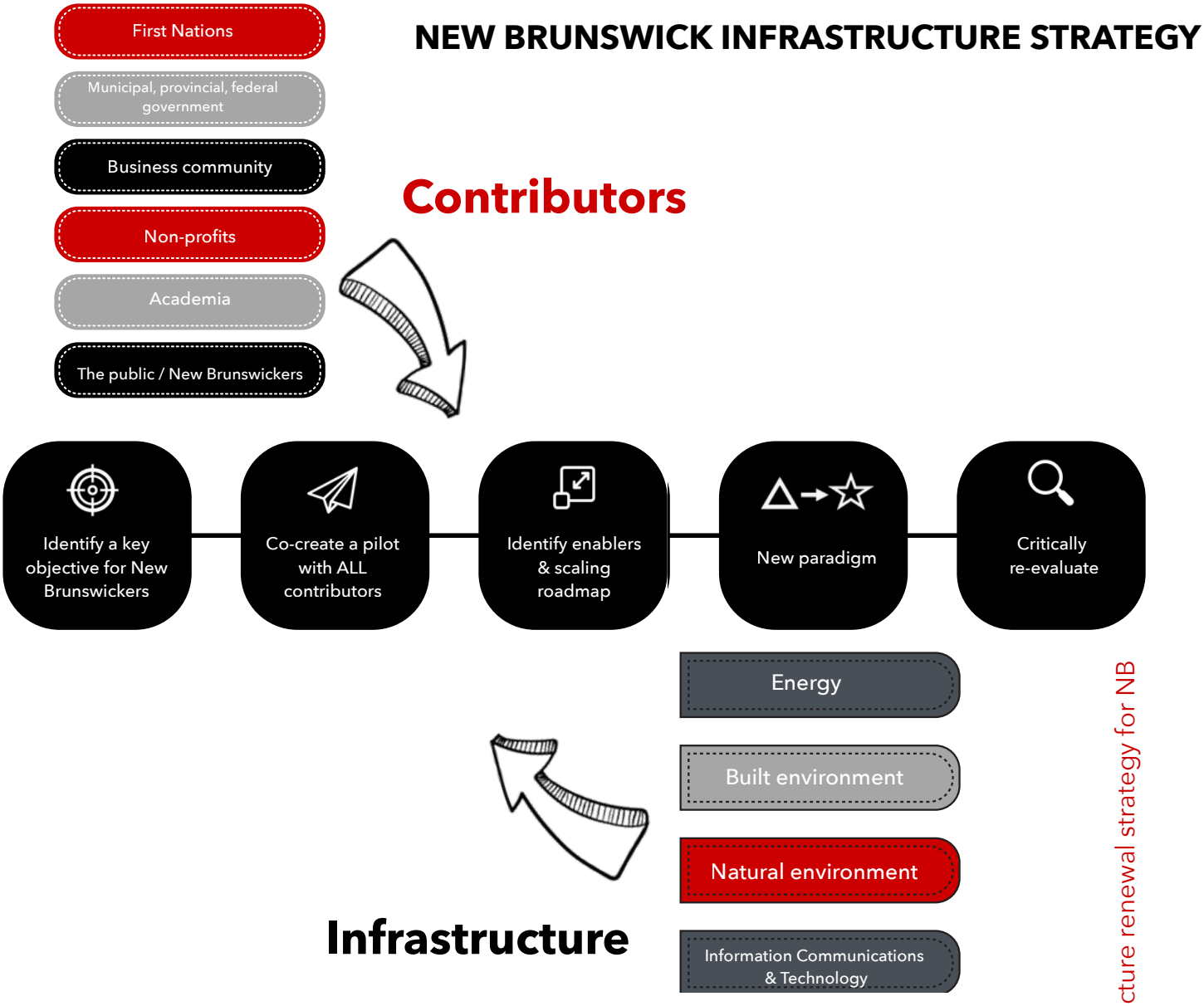
- **Engage.** By engaging New Brunswickers to understand (1) their views on how they could create or gain more wealth and improve or have a better quality of life, and (2) how they believe they could participate. We will need to raise awareness about infrastructure issues across all parts of society.
- **Develop a vision.** By developing a vision that transcends politics; a shared view, by focusing first on what we all agree is important.
- **Identify interconnections.** By identifying dependencies and interconnections between stakeholders, we will identify opportunities for new collaborations and creating more impact.
- **Develop a research agenda.** We will identify important knowledge gaps, failures, and practices and ways of working in other jurisdictions that could be adopted here. We will outline what we know, and what we need to know, to implement practices and creating institutions that will improve quality of life and create wealth for New Brunswickers.
- **Develop a business agenda.** By identifying how more New Brunswick businesses can participate and create wealth in the province. This includes involvement in the planning, design, construction, and operation and maintenance of infrastructure, but also other services that support our infrastructure foundations, such as social services, awareness and training, and art.
- **Identify alternative financing and funding mechanisms.** By identifying common goals between stakeholders, we can find opportunities to co-fund initiatives and create greater impact.

What we are proposing is big and ambitious – but it is necessary for New Brunswickers to thrive. We need a plan to set our course. One that involves engineers, scientists, architects, designers, educators and social scientists who understand how things work, and how to motivate people for change. One that mobilises New Brunswickers to create new businesses, and new industry. We need a plan that has short-term goals so that we engage and move quickly. And one that has longer term goals that inspire us to continue moving ahead.

Strategy in brief

Our overarching goal is to create wealth and improve quality of life for New Brunswickers. We will achieve this by:

- Engaging all New Brunswickers to identify and contribute to key objectives for the province
- Piloting / experimenting on new ways of working, including "undoing" detrimental infrastructure paradigms
- Identifying and implementing important changes to policy, regulation, funding mechanisms, guidance, training, and templates
- Scaling across New Brunswick
- Continuously critically reviewing achievement of our objectives; reviewing objectives; iterating



Achieving our vision will take decades, but we can begin testing new solutions now. The plan in the image below shows that we will continue to pilot and iterate to achieve our objectives. These pilots, incorporating all contributors in New Brunswick, will build strong, integrated foundations will transcend political cycles.

A plan to re-imagine infrastructure in New Brunswick

The main elements of our plan are to revolutionise the way we undertake these elements, to target the creation of wealth and improvement of quality of life in New Brunswick, by building trust, engaging the public, dismantling infrastructure paradigms that conflict with our goals, and identifying new ways of planning and funding our infrastructure and its effective functioning.

We will leverage the work that is already being done to create wealth and improve quality of life in the province. The Regional Development Corporation is currently reviewing the goals and strategies of all provincial government departments and regional service commissions, with the aim of identifying alignments and gaps in responsibilities towards a healthier, wealthier New Brunswick. From RDC's review will come a framework for responsibilities and accountabilities in the province

How did we get here?

Between **November 2023 and May 2024**, we discussed the concept of this infrastructure strategy with a wide range of interested parties across the province, to gauge interest and areas of concern and opportunity.

In **June 2024**, the Department of Civil Engineering hosted an event, inviting leaders and influencers from government, First Nations communities, academia, the non-profit sector, and the private sector. The aim of the event was to provoke thought and recruit members to draft a discussion paper.

Two main working groups were established, to focus on creating wealth and improving quality of life by focusing on **(1) Health in the Built Environment**, and **(2) Information and Communications Technology.** In addition, a small working group convened on the potential future role of energy in creating wealth and improving quality of life. Separate draft discussion papers were developed and form the basis for the discussion paper you are reading now.

Moving On

We are circulating this discussion paper to interested parties across the province for feedback. We must ensure we have incorporated all relevant initiatives and opportunities.

Immediate next steps are to reconvene the following groups to identify their objectives and understand how they can and want to contribute to increasing quality of life and creating wealth in New Brunswick:

1. First Nations communities
2. Provincial government
3. Regional service commissions
4. Municipalities
5. Post-secondary education
6. Business community and construction association

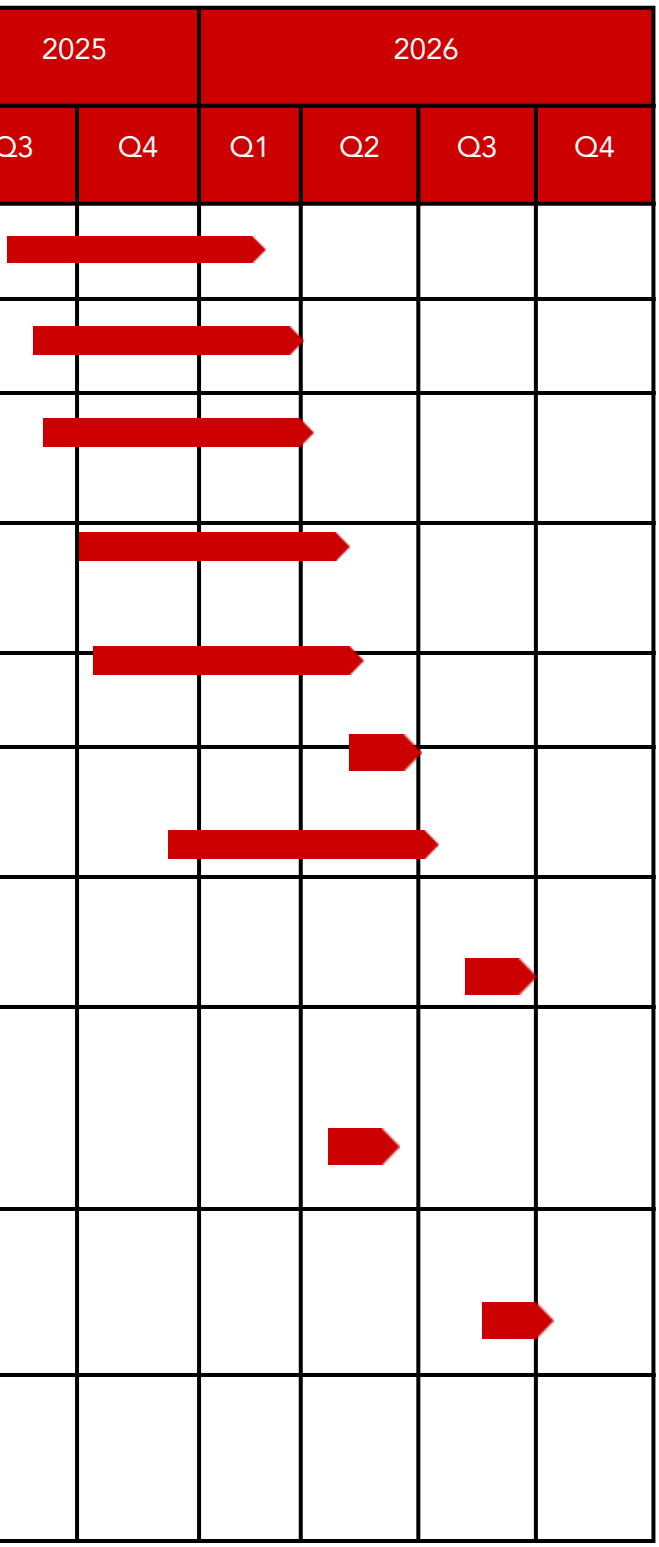
With each group, we will identify their objectives that contribute to the goal of improving quality of life and creating wealth; identify initiatives to leverage more broadly; and map accountabilities and responsibilities. Following these sessions, we will identify areas of common interest, overlap, and conflict, and reconvene the groups differently to maximise impact.

In addition, we will gather New Brunswickers who have left for larger centres such as Toronto, Ottawa, Calgary, and Vancouver, to understand why they left, and what it would take to bring them back home, to invest in their home province.

Through these engagements, we will develop more specific actions, including developing and funding a research agenda; developing and monitoring key performance indicators; and identifying our most important barriers to progress – and ways to overcome them.

Our ongoing commitment at the University of New Brunswick is to establish a baseline and monitor our progress over time, and to share this progress publicly.

Steps	Focus Groups	2025		2026			
		Q3	Q4	Q1	Q2	Q3	Q4
Identify objectives by group; existing initiatives	First Nations						
	Municipalities						
	Regional service commissions						
	Business community and non-profits						
	Provincial government						
	Post-secondary institutions						
Interviews	Former New Brunswickers						
Map accountabilities and responsibilities							
Identify pilots to address key objectives							
Develop pilots and research program							



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Appendix

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- Prof Rick Cunjak, Professor Emeritus in Biology and Forestry and Environmental Management, UNB
- Kaitlyn Gillis, Owner, Human Nature Connections
- Prof Trevor Hanson, Community Transportation Research Lab, Faculty of Engineering, UNB
- Prof Joshua Leon, Dean of Engineering, UNB
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- Dr Emily Richard, Associate Dean, Faculty of Nursing, UNB
- Dr Jennifer Russell, UNB Institute of Public Health
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- Brad Wasson, Executive Partner, Gartner

Thank you to all participants of the 25 June 2024 event, and everyone who has taken the time to talk to us.

Our principles

In considering how to leverage infrastructure to create wealth and improve quality of life, we focus on the following principles:

1.Self-sufficiency and agency. Our infrastructure strategy will create wealth that becomes self-sustaining, and we will have agency to choose how to improve the lives of New Brunswickers.

2.Empowerment and choice: New Brunswickers will feel empowered to participate in society and leverage digital technologies. They will not be barred from participating, experimenting or playing due to a lack of ability.

3.Awareness and accountability: Individuals and organisations in New Brunswick are made aware of their contributions to health, social connectedness, and are held accountable to them.

4.Future and unintended consequences: We fully consider the future and unintended consequences of land use planning, design, and participation and investment in ICT technologies. Examples: 1. facilities placed far from any neighbourhood increase the amount of support infrastructure required, reduce physical activity, increase GHG emissions, and make it more difficult to attract employees. 2. Moving all government services to the internet exposes New Brunswickers to financial and identity theft.

5.Equity: Increase access of equity-owned populations to employment, education, healthcare, social connectedness, and marketplaces. A focus on this demographic will have an inordinate positive impact on our economy and social fabric.

6.Resiliency and security: Our infrastructure should be able to withstand and recover from natural disasters, cyber attacks, and other disruptions, while maintaining essential services and functions – and not inordinately affecting equity-deserving populations.

7.Make the "right" choices easy: Cognizant that we must address structural and systemic barriers to healthy, benevolent behaviours and incorporate mechanisms to make the healthy, "right" choice the easiest one. We must make it easy to do good for society and for ourselves. On an infrastructure investment level, we must make the best investments the easiest investments, removing administrative burden to facilitate wealth creation.

Our principles

8.Lifecycle. Consider the whole health lifecycle and how investments in the built environment and associated services may prevent longer-term chronic illness and other health challenges, including burden on the healthcare system. Also consider how capital investments require ongoing operating and maintenance budgets.

9.Innovation: Our infrastructure should enable and support the development and adoption of new technologies, applications, solutions and collaborations that enhance the economic and social well-being of the province.

Infrastructure Trends

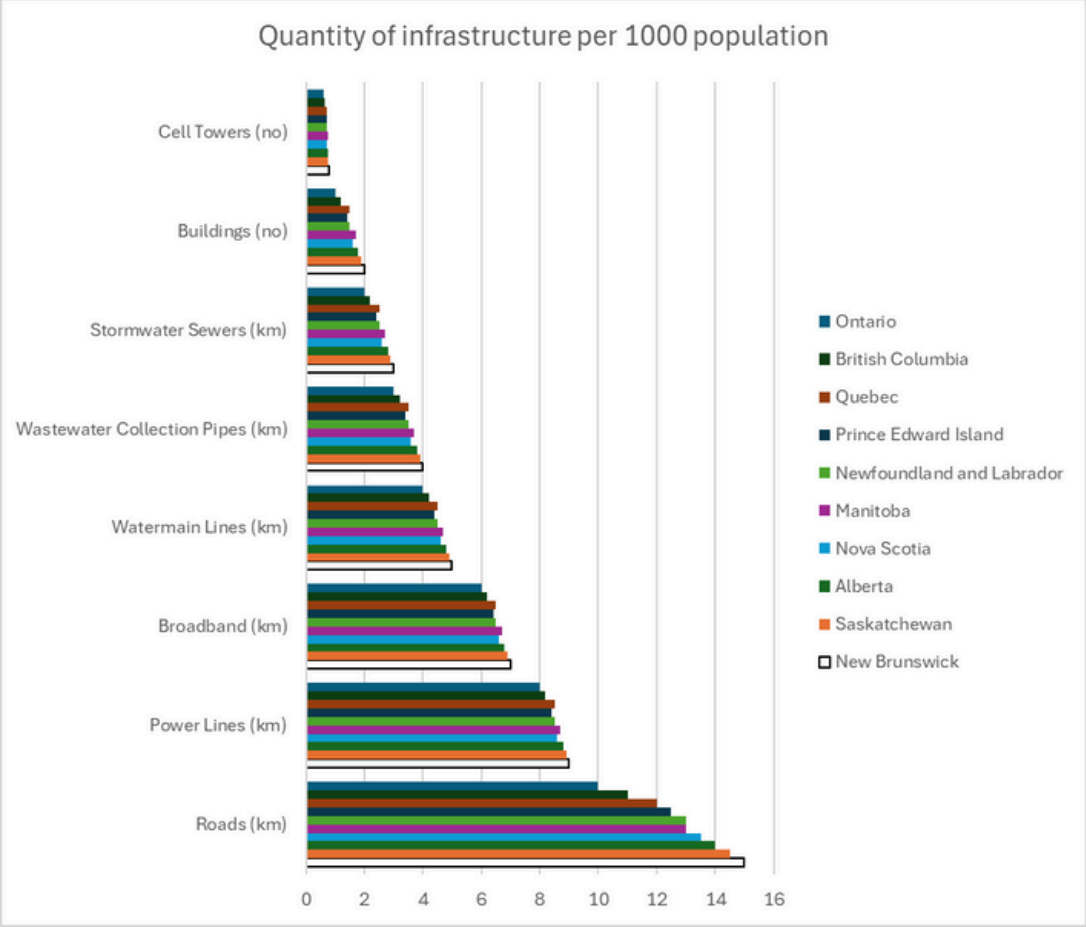


Figure 8. Quantity of infrastructure per 1000 population, by infrastructure category and by province (Estimated based on data available from StatsCan's Core Public Infrastructure Survey (StatsCan, 2024) (Statistics Canada, 2024; Statistics Canada, 2024; Statistics Canada, 2024))

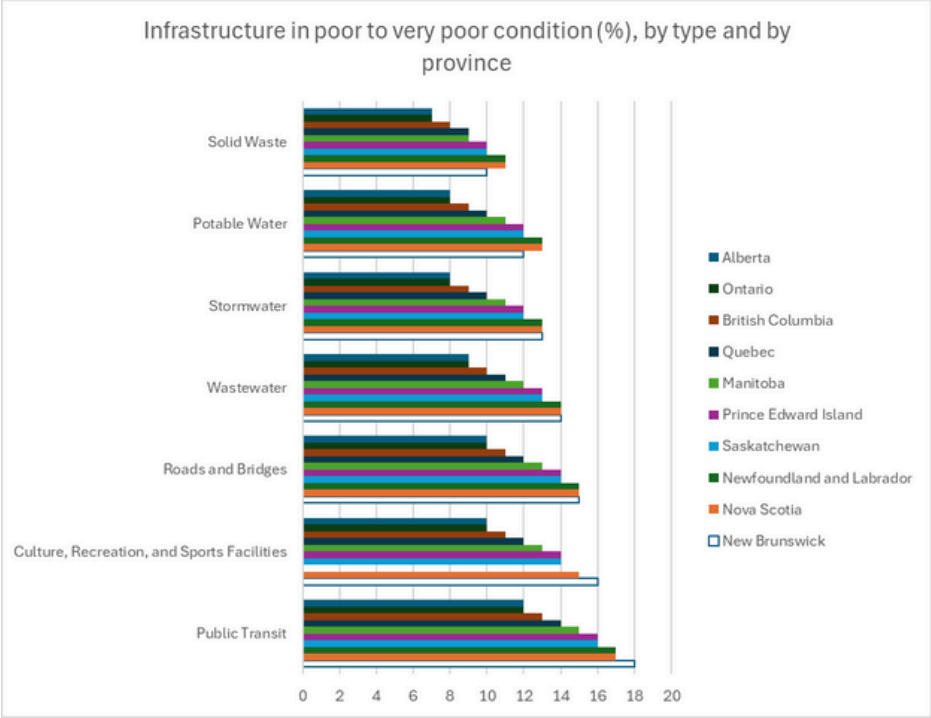


Figure 9. Infrastructure in poor to very poor condition (%), by type and province (source: Statistics Canada (2024))

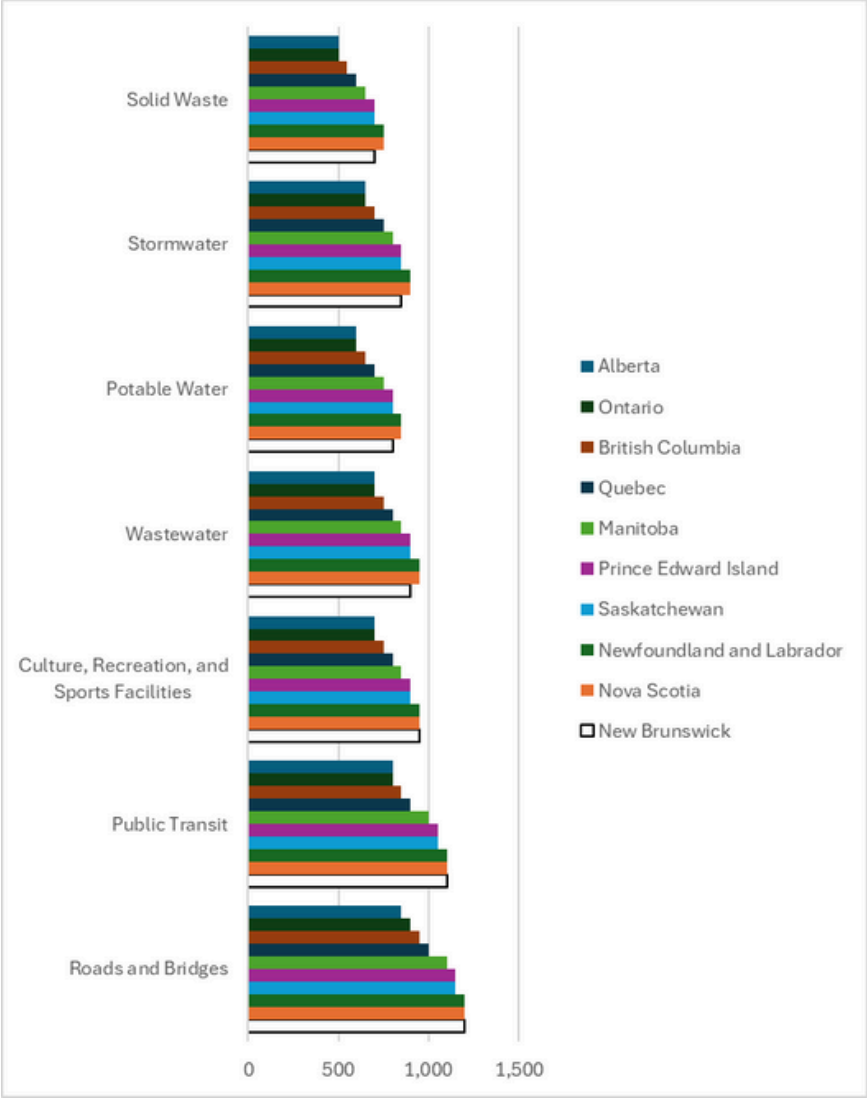


Figure 10. Replacement cost of infrastructure in poor to very poor condition, per capita. Source: Statistics Canada (2024)

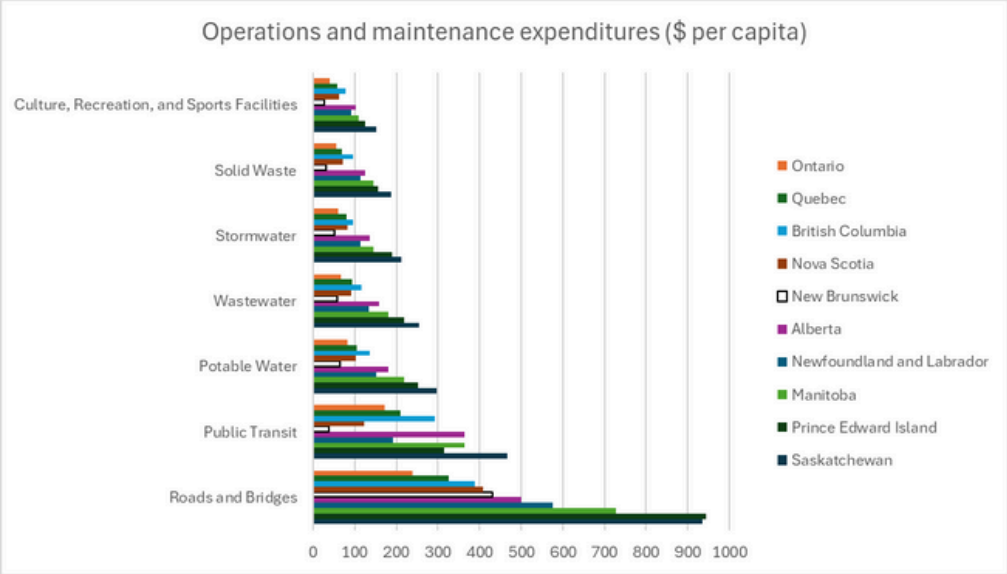


Figure 11. Operations and maintenance costs per capita, by infrastructure type, by province. Source: Statistics Canada (2024)

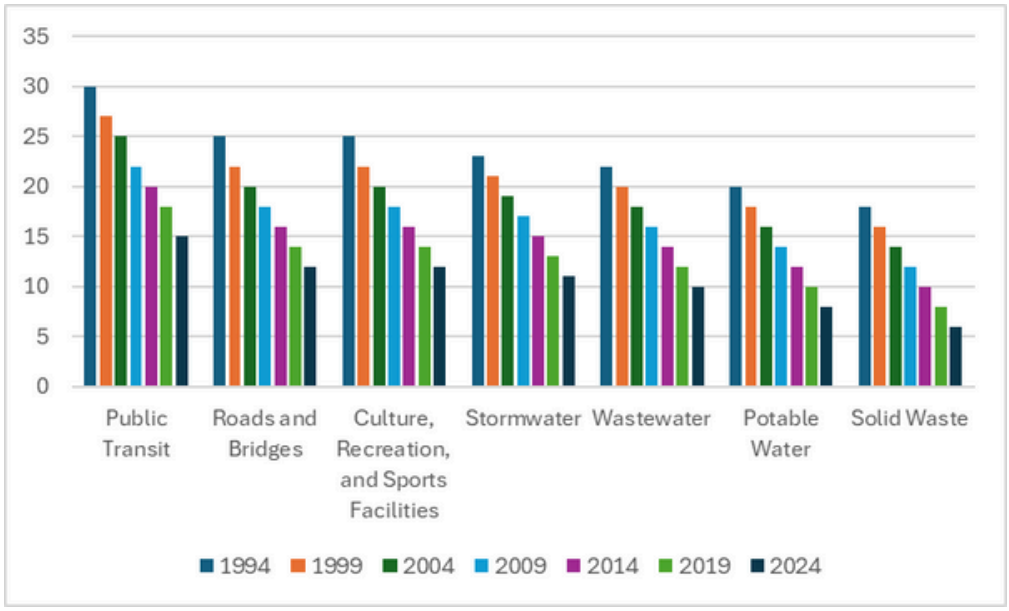


Figure 12. Percentage of assets in poor to very poor condition in New Brunswick, 1994 – 2024. Source: Statistics Canada (2024)

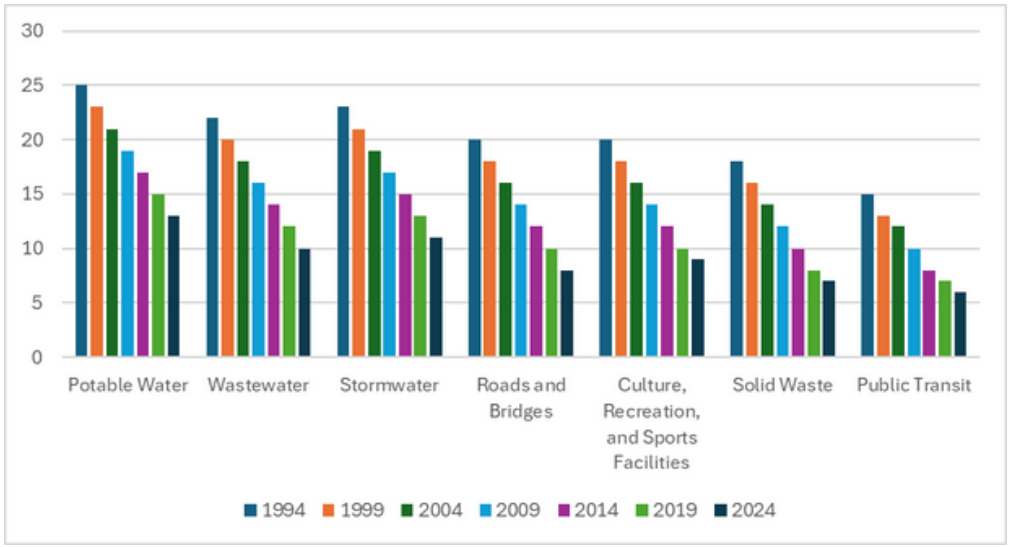


Figure 13. Remaining useful life of New Brunswick infrastructure, 1994 – 2024. Source: Statistics Canada (2024)

Truth and Reconciliation Calls to Action

Areas identified in Truth and Reconciliation Calls to Action with direct implications for infrastructure investment – to bring equality into First Nations infrastructure compared to non-First Nations – and to invest in infrastructure in all communities to increase understanding of First Nations cultures and histories:

- Childcare
- Education system – equal funding for quality, and provision for teaching using Indigenous knowledge and teaching methods
- Employment – access
- Health care
- Prisons / corrections system
- Spiritual facilities
- Cultural and language revitalization, acknowledgment. Museums, monuments
- Sport and physical activity
- Connectivity (addressed in the Closing the Gap report, not explicit but implied through the above in the Calls to Action)
- Housing (in Closing the Gap)
- Drinking water
- Main premise of closing the gap: gaps are inequity, sustainability, preparation for climate change, process. Aim is to stop "emergency reactionary responses" with "stable and comprehensive planning".

What are current initiatives and influencers we can leverage?

- RDC's framework
- UNB Institute of Population Health
- GNB's strategies for Energy, ICT, and Housing
- Regional Service Commission Strategies – land use planning, transportation, operationalising
- UNB Community Research Transportation Lab
- NB Institute of Research Data and Training
- NB physical activity strategy (in progress)
- ECD as a partner given school challenges
- CIHR-funded research
- ESIC, NB Together – overcoming poverty (poverty reduction strategy in development, recent priorities included public transit and accessible rec, housing likely to be primary focus in next strat)
- Climate change action plan (under redevelopment)
- Ability NB
- Age-friendly communities (e.g., Rothesay)
- Businesses who could be champions (e.g., Top 5 employers)
- New Brunswick Infrastructure Institute

Big unanswered questions to guide a research agenda for an infrastructure strategy for New Brunswick

- *Wealth creation and quality of life*

1. *How can we measure wealth creation?*
2. *What does wealth creation mean in a world with finite resources, within a framework that values equity?*
3. *What does quality of life mean?*
4. *How can we measure quality of life?*
5. *Can we take an integrated approach to measuring the dual goals of wealth creation and quality of life?*

- *Infrastructure costs and demands*

1. What is the state of New Brunswick's infrastructure?
2. What is New Brunswick's infrastructure « deficit »[16]?
3. What are the expected impacts of climate change on the demand for, and cost of, infrastructure in New Brunswick?
4. What are the expected costs of meeting net zero and accessibility requirements in New Brunswick?

- *First Nations investments*

1. What would be the economic impact of settling First Nations land claims in New Brunswick?
2. What are the costs of closing the infrastructure gap between First Nations and non First Nations communities
3. What would be the economic impact of closing the infrastructure gap for First Nations communities?

[16] There are many ways of estimating a deficit. For example, a deficit can be estimated based on bringing all infrastructure to a "good" condition; meeting a certain level of resilience or protection from aspects of climate change;

Big unanswered questions to guide a research agenda for an infrastructure strategy for New Brunswick

- *Health*

1. By how much can investments in municipal infrastructure and associated services reduce the healthcare burden?
2. What policies, regulations and standards have been used successfully in other jurisdictions to promote healthy lifestyles and reduce the healthcare burden? What are the current barriers?
3. How should we measure quality of life and wealth, and indicators?

- *Procurement*

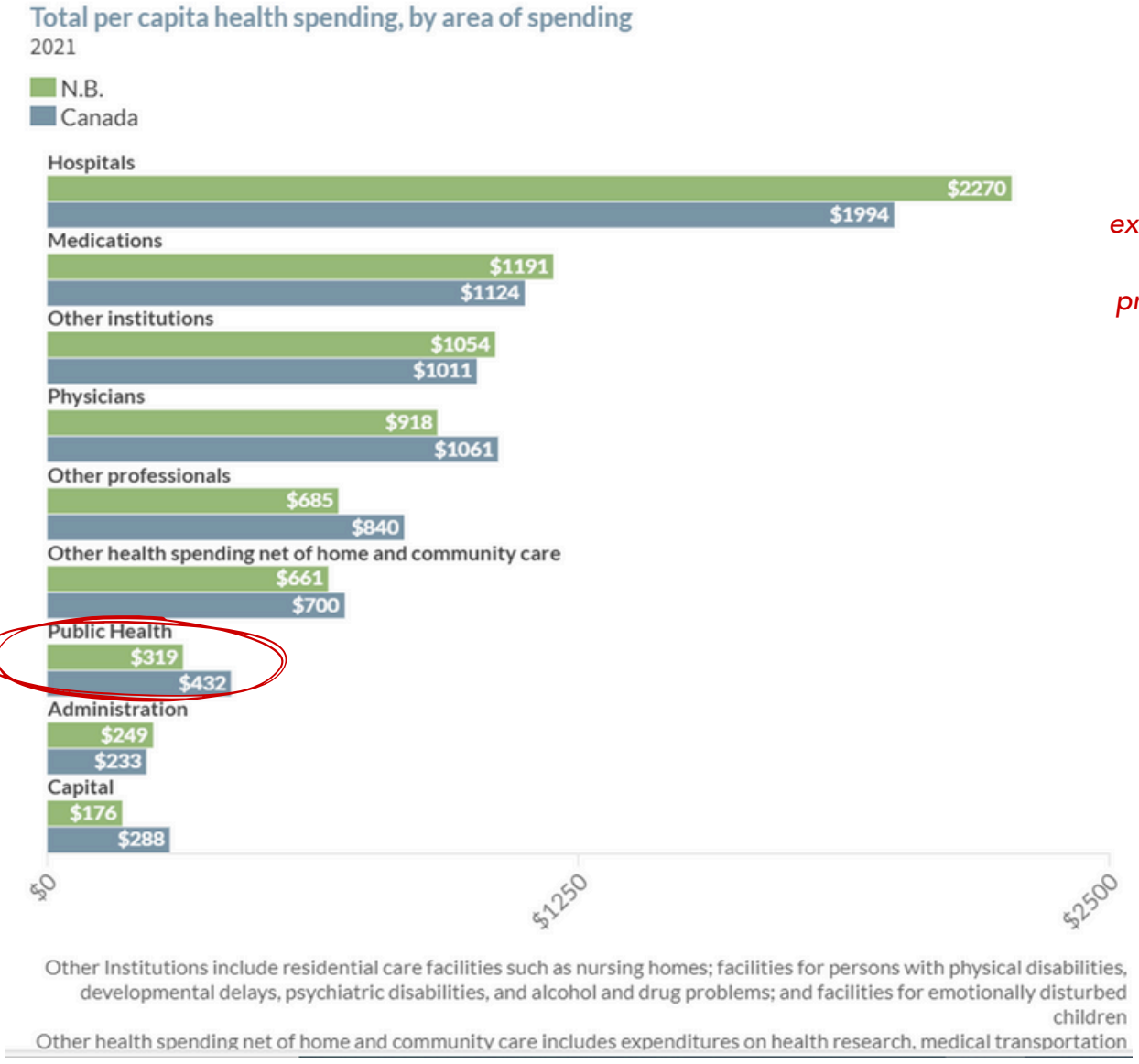
1. What percentage of infrastructure spending stays in New Brunswick?

- *Equity and economic outputs*

1. What are the economic benefits of providing equal access to employment, education and housing to people with lower incomes and disabilities?

[16] There are many ways of estimating a deficit. For example, a deficit can be estimated based on bringing all infrastructure to a "good" condition; meeting a certain level of resilience or protection from aspects of climate change;

New Brunswick health expenditures



Source: New Brunswick Health Council (2023)

Public health (preventive) expenditures are just 4% of provincial health spending.

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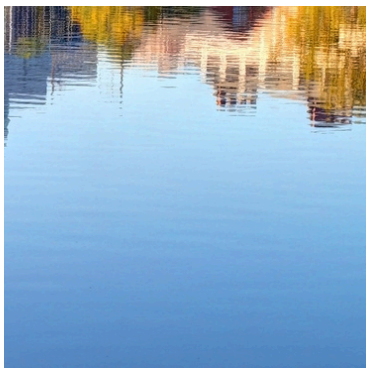
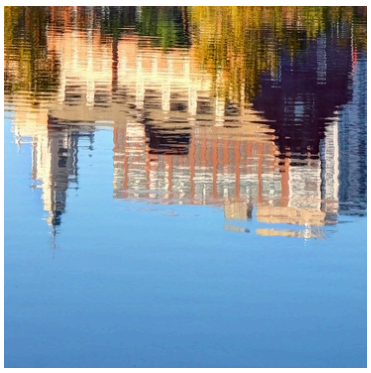

Let's Work Together

Please review this document, provide us with your comments, and tell us how you or your organisation are already playing a role, or wish to commit to strengthening your current role.

Reach out to us:

Anna Robak, PEng, PhD
anna.robak@unb.ca