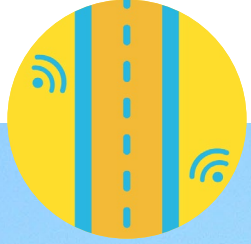


# CANADA'S INFRASTRUCTURE REVIVAL: Let's Get the Biggest Bang for our Buck



Canada's governments are preparing to spend historic amounts on infrastructure. To avoid creating 'white elephants', they should follow six key principles that will help the projects improve the country's productivity, competitiveness and social equity. [By Drew Fagan](#)



CHAMPLAIN BRIDGE, MONTREAL, QUEBEC

## SUMMARY AND RECOMMENDATIONS

Complaining about infrastructure is almost as Canadian as complaining about the weather. It begins with the fact that the two are linked; Canada's harsh winters and extreme temperature fluctuations as the seasons change take a toll on the country's roads (and vehicles) and other infrastructure.

But it's more than that. Sometimes it's as if everyone has a story about infrastructure gone wrong. Cost overruns. Late delivery. Sub-optimal results. Politics that trumps evidence.

'Twas always thus? Canada's first government fell over a scandal involving the contract for Canada's first megaproject: the Canadian Pacific Railway. Canada's postwar government was fatally wounded over parliamentary procedures regarding a national pipeline. These two massive initiatives knit the country together successfully and, indeed, pay economic dividends to this day. On the other hand, Canada's biggest cross-border infrastructure initiative—the St. Lawrence Seaway—was built on time and on budget but never lived up to expectations.

And today? In Toronto, the project cited as an example of how one *shouldn't* plan is the one-stop Scarborough sub-

The Government of Canada is leading a resurgence in infrastructure spending, with a 12-year budget of more than \$180-billion and the creation of key institutions such as the Canada Infrastructure Bank. Provinces are doing their part, with long-term infrastructure plans and more spending, and municipalities are also increasing their infrastructure budgets.

But will this spending be remembered for being visionary, innovative and inclusive, for building the country's productivity, competitiveness and social equity? Or will the successes be outweighed in the public mind in the years to come by the failures?

To ensure that infrastructure funding is spent to best effect, governments should set priorities and make decisions according to the following six principles:

1. **SMART PLANNING** that prioritizes key sectors critical to nationwide competitiveness and innovation, especially transportation and next-generation telecommunications
2. **SMART PROCUREMENT** that jump-starts the traditional procurement process
3. **SMART CONSTRUCTION** that focuses on execution and includes sharing best practices in new technologies to enhance productivity
4. **SMART BENCHMARKING** that establishes a national effort to standardize how infrastructure data is collected and used to enhance capacity
5. **SMART EMPLOYMENT** that focuses on the skilled trades and inclusion of under-represented groups, especially in priority communities
6. **SMART COORDINATION** that gives infrastructure a higher profile as a driver of Canadian prosperity

way extension, which led a [global list](#) of “urban white elephants” compiled last year by *The Guardian* newspaper. In Montreal, the epitome of how one shouldn’t build is the Champlain Bridge, which is now being replaced but needn’t have so soon had it been built to last in the 1950s. And on it goes, or so it seems.

And yet Canada is experiencing an infrastructure revival like almost never before. It is on a scale approaching the construction of the 1950s and 1960s, when modern Canada—our universities and colleges, our hospitals, our highways—was built.

## **Canada is making up for lost time on infrastructure renewal**

The federal government, which spent a generation reducing assets and spending only what it had to, is now leading the charge with a [12-year budget](#) of more than \$180-billion—almost double what it was [less than a decade ago](#) in nominal terms—and the creation of the reform-minded [Canada Infrastructure Bank \(CIB\)](#).

Provinces—[Ontario](#), [Quebec](#), [Alberta](#) and others—have created long-term infrastructure plans and increased spending significantly. Ontario’s most recent plan, announced by the previous Liberal government, called for annual spending of about \$20-billion—again, almost twice what it was less than a decade ago. Municipalities, which [control about 60 percent](#) of publicly owned infrastructure but have less revenue-raising authority than Ottawa and the provinces, have increased their budgets significantly, too.

The federal Parliamentary Budget Officer, and some of his provincial counterparts, have criticized the slow pace of actual expenditures, noting

that monies budgeted have not been spent as fast as planned. Prime Minister Justin Trudeau emphasized this point in [his most recent “mandate letter”](#) to the infrastructure minister, asking that the pace of federal-provincial infrastructure agreements and expenditures be made a priority.

But it’s important that infrastructure projects be done well as opposed to quickly. The Prime Minister has also emphasized that he wants his government to be judged on its performance from the perspective of 25 years hence, as well as from the perspective of a limited four-year mandate.

Infrastructure, in particular, still suffers from a stigma as a cyclical investment, made when the economy needs a boost, as opposed to a long-term tool for productivity and competitiveness. Fast is good but good is better.

## **Doing it smarter**

So what should be done to ensure that the increased funds are spent to best effect? It’s all about doing it smart, or smarter. In some cases, initiatives are already underway in Canada to do infrastructure smarter. In other cases, Canada has much to learn from countries that have invested more in thought leadership, especially technological innovation.

What is smart infrastructure? Smart infrastructure, according to the [Cambridge Centre for Smart Infrastructure and Construction in Great Britain](#), comes from melding physical infrastructure with digital infrastructure so as to improve information and drive better decision making, construction and operations. As just one example, smart grid technology promises to [reduce the cost of electricity production, consumption and distribution](#) by iden-



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tifying and reducing wasteful consumption, matching demand with supply and providing information to consumers.

Digital infrastructure—sensors and networks, big data and machine learning—is the key to getting more out of the infrastructure already built by increasing capacity, efficiency, reliability and resilience. It also means more effective planning of future infrastructure investment. Greater infrastructure efficiency means enhanced service delivery with lower costs and often a smaller physical footprint and less environmental impact.

This is critical for mature economies such as Canada's, where new infrastructure assets add no more than one percent annually to the total value of existing infrastructure, as well as emerging economies such as India, which expects to more than double its infrastructure stock by 2030.

There are myriad ways to get to smarter results in infrastructure, including smarter planning, procurement, construction, benchmarking, employment and coordination.

### 1 SMART PLANNING

Canada has not done a national infrastructure audit—although some provinces have—nor a national infrastructure plan, as have countries such

as Australia, New Zealand and Great Britain.

The federal government has set up what promises to be a world-class infrastructure agency in the CIB. The CIB is focused primarily on leveraging \$35-billion in seed capital to draw in private and institutional money to build revenue-generating infrastructure.

The CIB also has been charged with leading a broader effort to gather infrastructure data and information nationwide to improve the evidence base for decision-making. To that end, as the CIB moves from start-up to build-out and steady-state operations, it will be well placed to participate in conversations about Canada's infrastructure priorities and provide thought leadership on how best to get these done.

For example, should Canada have a single policy anchor to prioritize capital investment, such as productivity enhancement? If so, what sectors and initiatives would be prioritized? Most likely, according to experts inside and outside government interviewed for this paper, they would fall into two overarching and linked areas:

1. Transportation, including multi-modal transportation networks and enhanced rapid transit, as well as gateway transportation infrastructure to the United States and to the east and west coasts for

trade with offshore markets

2. Next-generation telecommunications, such as 5G networks, which are becoming “table stakes” for countries pursuing a digital future, including for driver-assisted and autonomous vehicles. (4G made smartphones ubiquitous, including by making streaming video available 24/7; 5G will drive both a business and consumer transformation by enabling the Internet of Things—the interconnection of computing devices in objects big and small, enabling instantaneous transmission of data.)

## 2 SMART PROCUREMENT

Canada has been at the forefront of a global trend toward greater private sector involvement in construction and operations of public infrastructure assets. Public-private partnerships have been proven, by many studies, to be more effective than

traditional public sector delivery, especially through the pricing of risk, whereby private sector consortia are paid a premium to take on responsibility for any cost overruns when building and operating infrastructure to government specifications.

This was an innovative model even if, according to some experts, P3s have never driven the degree of innovation envisaged because governments remain averse to being too cutting-edge for fear of getting things wildly wrong.

What if governments didn’t just sign contracts to build projects that they specify, but also opened the infrastructure field entirely, by asking any and all comers to provide new ideas about what should be built and how it should be built?

As one infrastructure expert put it: solicited proposals result in “small ‘i’ innovation,” while unsolicited proposals will result in “big ‘I’ innovation.”



## WHAT IS SMART INFRASTRUCTURE?

**Melding physical infrastructure with digital infrastructure to improve information and drive better decision making, construction and operations. Digital infrastructure—sensors and networks, big data and machine learning—is the key to getting more out of infrastructure already built by increasing capacity, efficiency, reliability and resilience.**



The wonderfully named [Office of Extraordinary Innovation](#) within the Los Angeles County Metropolitan Transportation Authority has made unsolicited proposals the backbone of efforts to do things smarter. It has reviewed dozens of proposals, including in areas encouraged by the office itself—such as big data, data analytics and data management, and mobility on demand, shared rides and micro-transit. The goal, according to the office, is to “jump-start the traditional procurement process.”

A key mandated role for the CIB will be the encouragement and evaluation of unsolicited proposals. Indeed, the first investment made by the CIB relates to an unsolicited proposal—the [Réseau express métropolitain](#) project in the region of Montreal proposed by the Caisse de dépôt et placement du Québec.

Infrastructure agencies at the provincial and municipal levels would benefit from the same process.

### 3 SMART CONSTRUCTION

Why does the construction industry, which [employs about eight percent of the world’s working-age population](#), lag all sectors in productivity growth except agriculture and hunting? The reasons have much to do with who pays the bills. Construction is funded to a sizeable extent by government, which means it remains heavily regulated, following often opaque rules and bound to a risk-averse culture.

But the construction industry also is ripe for disruption. It remains widely fragmented, with a significant variance in capacity between global companies and national and local companies, which often benefit from less than transparent contracting practices. It lags industries such as automotive

and financial services in deployment of advanced analytics and planning tools. In construction, these include building information modelling and so-called digital twins, which provide representations of a project’s physical and functional characteristics and operations.

It’s not just technological innovation that must be improved to bring sector productivity growth up to the average for the global economy—one percent annually compared to almost three percent over the past 20 years, according to the McKinsey Global Institute. Better supply-chain management and onsite execution, better contracting—including better allocation of risk—and a better-trained workforce (more on that below) would go a long way, too.

The National Infrastructure Commission (NIC) in Great Britain [released a study](#) last year on global best practices in deploying technology to boost sector productivity throughout the asset lifecycle. Examples included [Virtual Singapore](#), which maps the urban areas of Singapore in real time on multiple factors related to asset efficiency, and other innovations gleaned from Europe, the Middle East and Asia.

Canada has numerous globally competitive construction companies, but the sector would benefit through the sharing of best practices around construction productivity enhancement.

### 4 SMART BENCHMARKING

Infrastructure remains stuck in the past—not just in the way it often operates, but also in the image it often projects. Asphalt is infrastructure, certainly. But so is building information modelling, for example, and so is data. As the NIC noted in

another recent report “Data is part of infrastructure and needs maintenance in the same way that physical infrastructure needs maintenance.”

An effective data strategy starts with a prioritized audit of existing assets and builds on this with the deployment of real-time data monitoring and secure data sharing to ensure maximum benefit. As an example, [Transport for London](#) is a leader in the sharing of information on travel patterns, which has encouraged travel apps and real-time alerts, reducing uncertainty and increasing public transit use.

Closer to home, Ontario’s [most recent long-term infrastructure plan](#), released in November 2017, included the province’s first inventory of all provincially owned infrastructure, set out by sector and by asset condition.

Queen’s Park is now working on a digital condition index, beginning with the primary and secondary school system, under the assumption, as set out in a recent paper, that schools now consider “internet technology as the ‘electricity’ that powers the education process.” Proposed benchmarks include internet connectivity, WiFi coverage and other communications infrastructure measurements.

The CIB could help lead a national effort to broaden and standardize infrastructure data collection and deployment, rather like the Canadian Institute for Health Information does in the health sector.

## 5 SMART EMPLOYMENT

The infrastructure sector needs to recruit experts in the effective deployment of technology, including big data. But it also needs to recruit those educated in the skilled trades. Over the next decade, roughly 200,000 sector workers are

expected to retire. But the apprenticeship training system will strain just to replace those leaving, let alone expand the numbers to keep up with rising demand due to rising infrastructure expenditures.

Why such a challenge? Ottawa as well as numerous provinces have launched new funding programs and initiated policy reviews to encourage young people to consider as a career skilled trades such as electricians, plumbers and carpenters. But the trades continue to suffer as the perceived poor cousin of the post-secondary sector, behind universities and colleges. And the path to an apprenticeship certificate is particularly challenging, including hard to navigate enrollment processes and inflexible rules concerning on-the-job training.

A coordinated national effort is overdue. Different provinces and territories are projected to have different needs, certainly, but all are expected to face challenges that must be addressed if infrastructure projects are to have the skilled workers needed in a decade or two. This would include a recruitment focus among underrepresented groups—women, visible minorities, Indigenous Peoples and people with disabilities—and community benefits packages in infrastructure projects, such as local job creation and training opportunities and improvement of public spaces, especially in communities with below-average incomes. The largest transit project in the country—the [Eglinton Crosstown LRT in midtown Toronto](#)—has a well-received community benefits program and British Columbia is the latest province to initiate such a policy province-wide.

## 6 SMART COORDINATION

The federal government and the provinces and territories have established a formal coordination process. Ministers now meet annually, includ-



ing with representatives of municipal governments. Many of the challenges and opportunities cited in this paper would benefit from discussion at this table, particularly if the CIB is included and given a leading role in guiding progress in key areas.

But, more generally, infrastructure deserves a higher profile as a driver of Canadian competitiveness and prosperity.

Best practices deserve to be highlighted, such as Stratford, Ont.'s early and widespread adoption of broadband and digital technology, and Innisfil, Ont.'s recently expanded experiment with

micro-transit, in which the town contracted Uber to provide pooled, flat-fare rides between high-volume locations.

Initiatives such as the federal government's [Smart Cities Challenge](#) and the [CanInfra Challenge](#) sponsored by the Boston Consulting Group deserve to become regular affairs, sparking continued efforts within government, the private sector and even students to think smart about what it means to build 21st century infrastructure. After all, some of the infrastructure we build today, if built smart, will still exist when the 22nd century dawns.

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