

ReNew

May/June 2020

C A N A D A

The Infrastructure Magazine

- + Replacing Lead Infrastructure
- + Designed for Resilience
- + Infrastructure in Pandemics

CRUMBLING ASSETS

Prioritizing Investment
in Aging Infrastructure

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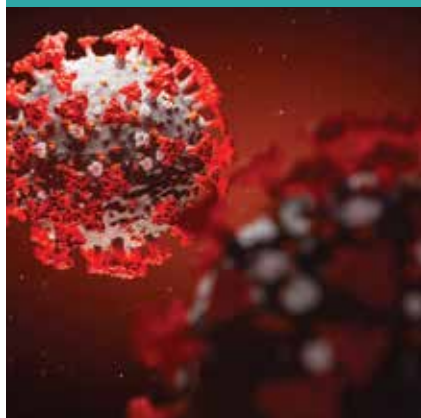
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ReNew

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MAY/JUNE 2020

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AN EARLY LESSON FROM COVID-19

By Andrew Macklin

It was the morning of March 19 and most of the country was hunkered down at home, still getting the day-to-day demands of the job completed while balancing the new realities that come with the outbreak of a global pandemic.

My view provided me with a pretty comprehensive understanding of how the world had changed since the governments of Ontario and Canada had introduced significant measures to curtail human interactions and further spread of the virus: a nearly-empty GO station parking lot, a stretch of the QEW unencumbered by traffic, and a significant slowing of business activity. The one thing in the view that hadn't changed: the activity on nearby construction sites.

Across the social media landscape, you could read quips about people complaining about why certain people are still working, why certain industries were continuing with business as usual. In my social group, one of those industries was construction. Why were those construction sites still a hub of activity?

I decided that I needed to respond. And the best way to do that was to start gathering information from the engineers, contractors, and labour groups working at the active sites across the country. I started going website by website, looking for information about the proactive measures. And what I found, for the most part, was pretty disappointing.

Some of the websites I visited had token mentions of the coronavirus and the fact that it was impacting their business, but even fewer had any mention of the specific actions being taken to keep workers safe. This at one of the most crucial times

in our history, where people's safety has taken precedence over just about everything.

In an era where community engagement by the construction industry is vital, this was a crucial missed opportunity. Here was a chance for the industry to prove it is interested in building communities instead of boosting profits. It was a chance to tell cities that workers will be protected while still building the assets that communities will desperately need when the crisis subsides.

So then why did we not recognize this as an opportunity for positive community engagement? For one, I don't think the industry was prepared for this. I'm not sure that contractors necessarily had a plan in place for what happens to a jobsite during a health crisis other than shutting down the site. Perhaps this doesn't fall into the typical scope of a crisis communications plan, so telling the community about how people are impacted during a crisis like this was overlooked.

You owe it to the communities who spend millions of dollars retaining your services, the communities that you and your team call home, to let them know how you are taking this crisis seriously by keeping everyone safe.

If there is a next time, and I truly hope there isn't, the industry needs to show that they are the leaders that I know you all to be. 🌱

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As governments push to fund new infrastructure development, existing assets lack the funding sources needed to stay viable. Turn to page 10 to learn more about what approach is needed to ensure aging assets continue to serve our communities.

OPTIONS REVEALED FOR BURRARD INLET TRANSIT CROSSING



The technical feasibility study of a potential high-capacity transit crossing from Vancouver across the Burrard Inlet to the North Shore has completed Phase 1. Six potential options have been shortlisted to be explored further in Phase 2.

“We know that people living and working on the North Shore are frustrated with traffic congestion that has been increasing for years,” said Claire Trevena, Minister of Transportation and Infrastructure. “By investing in this study, our government is helping to take a serious look at solutions that expand our public transportation network to better connect communities and to help people move around freely. The results from this study will support the North Shore and surrounding communities with their long-term transportation planning.”

This work resulted in six general routes that will be further explored in Phase 2 (type of crossing in parentheses): downtown Vancouver to Lonsdale via First Narrows (tunnel crossing); downtown Vancouver to Lonsdale via Brockton Point (tunnel crossing); downtown Vancouver to West Vancouver via Lonsdale (tunnel crossing); downtown Vancouver to Lonsdale via Second Narrows (new bridge crossing); Burnaby to Lonsdale via Second Narrows (new bridge crossing); Burnaby to Lonsdale via Second Narrows (existing bridge crossing)

The Ministry of Transportation and Infrastructure, the districts of North Vancouver and West Vancouver, and the cities of Vancouver and North Vancouver are contributing to fund the study. TransLink led the procurement process for this study. The results will be used to inform the development of Transport 2050, TransLink’s updated regional transportation strategy. ♣



CDPQ ACQUIRES
PLENARY AMERICAS

Caisse de dépôt et placement du Québec (CDPQ) and Plenary Group (Canada) Ltd. (Plenary Americas) announced CDPQ’s acquisition of Plenary Americas, an investor, developer, and operator of public infrastructure in North America.

With this investment, CDPQ acquires Plenary Americas’ operating business, as well as a controlling stake in its existing public-private partnership (PPP) portfolio. With 36 projects, Plenary Americas’ collection of social and civil infrastructure assets is unique in both its geographic and sectoral diversification. Plenary’s under-construction portfolio of P3 projects in Canada includes the Mackenzie Vaughan Hospital, Corner Brook Acute Care Hospital, CAMH Phase 1C Redevelopment, and the Library and Archives Canada Preservation Centre.

“Plenary Americas is recognized for its highly skilled project development team and solid operational expertise. It is well positioned to act on growth opportunities, notably in the United States, where infrastructure needs are rising and long-term investors, such as CDPQ, can play a role in bridging the funding gap,” said Emmanuel Jaclot, executive vice-president and head of infrastructure at CDPQ. “For CDPQ, it is an opportunity to strengthen our presence in social infrastructure and create a powerful platform to develop assets that are at the heart of communities.”

John O’Rourke, Plenary’s global chairman, explained that CDPQ and Plenary have been partners since 2012 when CDPQ first invested in Plenary’s Australian PPP projects. “Our long-standing relationship gives us enormous confidence in the success of the acquisition for both CDPQ and the North American business. The acquisition validates Plenary’s global standing in the PPP market and our long-term partnership model”, he noted.

“There is a natural fit between CDPQ and Plenary Americas, and we are closely aligned with their investment philosophy, their culture and their values,” said Brian Budden, president and CEO of Plenary Americas. “We are very enthusiastic about the potential of this new platform, and we are confident that our PPP expertise, combined with CDPQ’s strength and investment experience, will allow us to seize new opportunities.”

In addition to this investment, CDPQ maintains its close relationship and 20 per cent ownership interest in Plenary Asia Pacific. Plenary Americas and Plenary Asia Pacific will continue to work together closely, sharing knowledge and resources, and potentially exploring new markets. ♣

NEXT ISSUE: JULY/AUGUST
THE LABOUR ISSUE

Lessons from
COVID-19

Health and safety lessons for future construction.

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Risk
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Interim report released for Phase 2 of BC Hydro review



The interim report from Phase 2 of the BC Hydro review has been released, focusing on leveraging B.C.'s clean hydroelectricity to meet the province's climate goals and support economic development.

The report describes the scope, context, and work to date for Phase 2 of the review. It presents a number of ideas for discussion, including:

- optional rate designs to encourage the shift from fossil fuels to electricity in vehicles, homes and businesses and achieve the emission reduction targets in CleanBC;
- measures to expand the electrification of B.C.'s growing economy and attract new, clean businesses to B.C., creating jobs and opportunities;
- changes to give BC Hydro more flexibility to meet future demand for clean electricity at the least cost to keep rates affordable;
- a 100 per cent clean electricity standard, which would be the first provincial standard of its kind in Canada; and

- key issues and themes related to enhancing Indigenous Nations' participation in the energy sector and furthering reconciliation.

The Ministry of Energy, Mines and Petroleum Resources will now gather further feedback from stakeholders, customer groups, and Indigenous Nations and organizations based on the interim report. This feedback will support the development of recommendations for a final report to be completed later in 2020.

Phase 2 of the review will position BC Hydro for long-term success and support the development of its Integrated Resource Plan (IRP) to be filed with the B.C. Utilities Commission in early 2021. The IRP outlines how BC Hydro plans to safely provide reliable, affordable, clean electricity to meet customers' needs now and into the future.

Phase 1 of the review was completed in February 2019. It resulted in immediate actions to contain BC Hydro's costs, keep rates affordable, and expand independent oversight by the B.C. Utilities Commission. BC Hydro's five-year rates forecast is now approximately 55 per cent lower than the 13.7 per cent cumulative increase for the same period under the previous government's 10-year rates plan, and more than 40 per cent lower than the 10.7 per cent forecast rate of B.C. inflation over the same period.

To view the interim report, visit bit.ly/HydroPhase2 🌱



SaskPower issues RFP for next wind generation project

SaskPower is moving forward in the competitive process for the next wind generation project with the Request for Proposal (RFP) for up to 300 megawatts (MW) of wind power. SaskPower received 19 applications into the Request for Qualification (RFQ) phase, and of those, all 19 have been invited to submit proposals for the RFP process.

"This new project builds on SaskPower's commitment to the Prairie Resilience climate change strategy to reduce greenhouse gas emissions by 40 per cent below 2005 levels by 2030," said SaskPower Minister Dustin Duncan. "This is one of several projects undertaken by SaskPower to work towards a cleaner energy future without the need for the federal government's carbon tax."

When complete, this project could generate enough electricity to power approximately 120,000 homes.

"Adding more wind power plays a key part in SaskPower's journey to a cleaner energy future by further reducing the

carbon footprint of electricity generation in the province," said President and CEO of SaskPower Mike Marsh. "SaskPower is rising to the challenges that the future holds: a growing demand for power, the transition to cleaner generation options, and the need to continue to upgrade aging infrastructure and modernize the power grid. All while ensuring reliable, cost-effective and sustainable power for our customers."

The competition is being conducted through a two-stage process. In February 2019, SaskPower issued an RFQ to identify independent power producers. Qualified proponents had until January 6, 2020 to submit their proposals.

"All proposals will be evaluated equally through an open, fair and transparent process," said Vice President of Transmission and Industrial Services Kory Hayko. "The successful proponent will be announced in January 2021, with the project expected to be in-service in December 2023." 🌱

Photo: Stephen Wickens



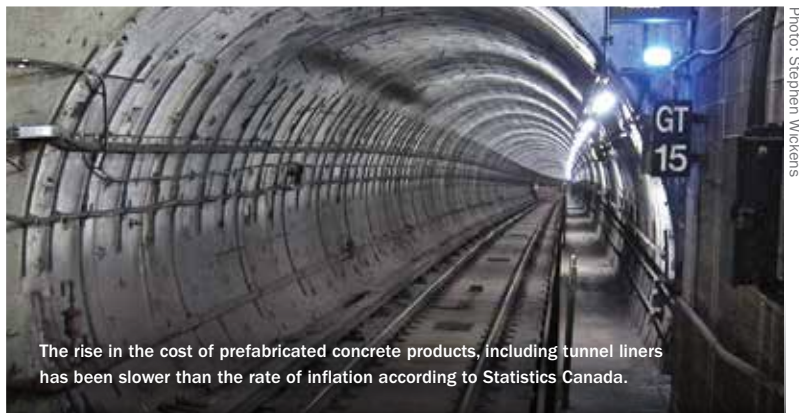
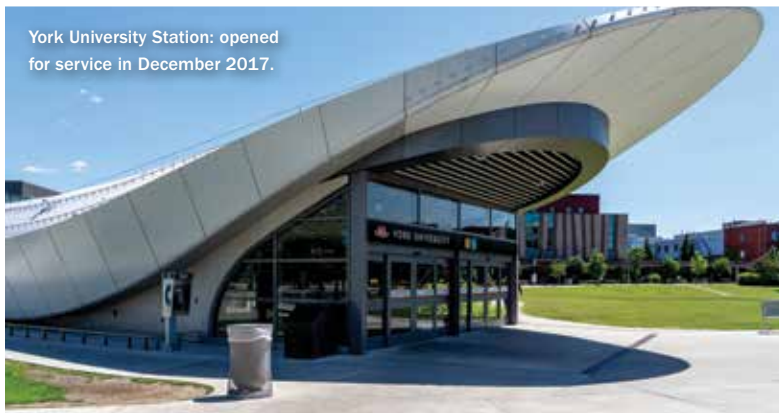
Deep stations are particularly reliant on escalators, which aren't always in service.



Prime Minister Justin Trudeau joins then-Premier of Ontario Kathleen Wynne and Toronto Mayor John Tory, among others, for the ribbon-cutting of the TYSSE.

Photo: Jenna Muirhead

York University Station: opened for service in December 2017.



The rise in the cost of prefabricated concrete products, including tunnel liners has been slower than the rate of inflation according to Statistics Canada.

Photo: Stephen Wickens

STATION TO STATION

Why Subway-building Costs Have Soared in the Toronto Region

Research by Oxford professor Bent Flyvbjerg has found rail-based transit projects in Western countries tend to experience delays and are chronically over budget. Toronto is not immune to this phenomenon.

A new RCCAO report by transit historian and journalist Stephen Wickens, called “Station to Station: Why Subway-building Costs Have Soared in the Toronto Region,” provides an in-depth evaluation based on reviews of projects here and elsewhere. The Toronto-York-Spadina subway extension, for example, cost nearly four times as much as the average per-kilometre cost of TTC-managed 20th-century subway projects – even after adjusting for inflation.

The report assesses the effectiveness of current project planning and evaluation models as well as the public-private partnership (P3) procurement approach used for the under-construction Eglinton Crosstown LRT.

Despite the touted advantages of P3s, two planned subway projects in the Toronto region could cost nearly twice as much per kilometre as the Spadina extension.

Based on an analysis of 11 variables, Wickens concludes

the top-two cost drivers are deep tunnel construction and political interference in the planning process:

1 Minimize the use of tunnels and keep tunnels as shallow as possible when there is a need to go underground. Cut-and-cover tunnels and, in less-dense contexts, at-grade or above-ground alignments can reduce overall costs significantly while speeding up project delivery. Surface projects will also reduce long-term operating and maintenance costs.

2 Approve long-term transit plans based on real evidence. Politicians should still choose which projects get approved and funded, but only from menus of options prepared by transit specialists freed to exercise professional independence. The Toronto region’s multi-decade descent into a transit crisis is rooted partly in a power structure that encourages “decision-based evidence making.”

It is hoped that this research will jumpstart an urgent debate on how to improve all aspects of delivery for complex transit-infrastructure projects.

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NORTHERN PRIORITIES

Sitting down with NWT Minister of Infrastructure Katrina Nokleby. *By Andrew Macklin*

No region of Canada is without its infrastructure issues. But with a small tax base and a climate playing havoc on its lands, the infrastructure challenges in Canada's northern territories are significant.

In November 2019, Katrina Nokleby was named the Minister of Infrastructure under new Premier Caroline Cochrane. Nokleby, the Member of the Legislative Assembly for the Yellowknife-based riding of Great Slave, is no stranger to the business. A consulting engineer by trade, she served as the president of the Association of Consulting Engineering Companies from 2015-2017.

Just a few months into her role, Nokleby is already knee deep in a sea of growing infrastructure priorities that all need to be addressed sooner than the money can flow to address them.

How has your engineering background helped ease you into your new role?

I honestly don't know how you could take on this portfolio without some sort of technical or private industry background. I had issues with procurement as a consultant, so understanding what those concerns were, then I could add the department certain questions. [...] So I know that [...] the department was actually quite excited to have an engineer that they didn't necessarily need to explain what

they were doing to. I understand what they are doing so we can have a conversation a lot quicker about where we are going with the department versus 'we have to spend two years getting our minister up-to-date on what infrastructure means.'

Now that you are into the role, what are some of the changes that you would like to make?

We have an issue in the north where, particularly once the downturn in Alberta happened, where we see a lot of southern companies eyeing business in the north and wanting to do business in the north. But then for us as a government that doesn't really make a lot of sense. Because if, with our own procurement dollars, we are hiring southern firms, that money is leaving the territory. Whereas if we hire northern businesses who hire local and northern people, then we are helping ourselves from an income support standpoint.

One of the things I really want to see is, and it is one of our priorities under the new assembly, is to maximize GNWT dollars for northern and Indigenous businesses. Keeping that money in the north and using our projects, our big infrastructure projects, to create apprentices and training people so that the Indigenous groups and their organizations are not just the unskilled labour. I would like to use our procurement

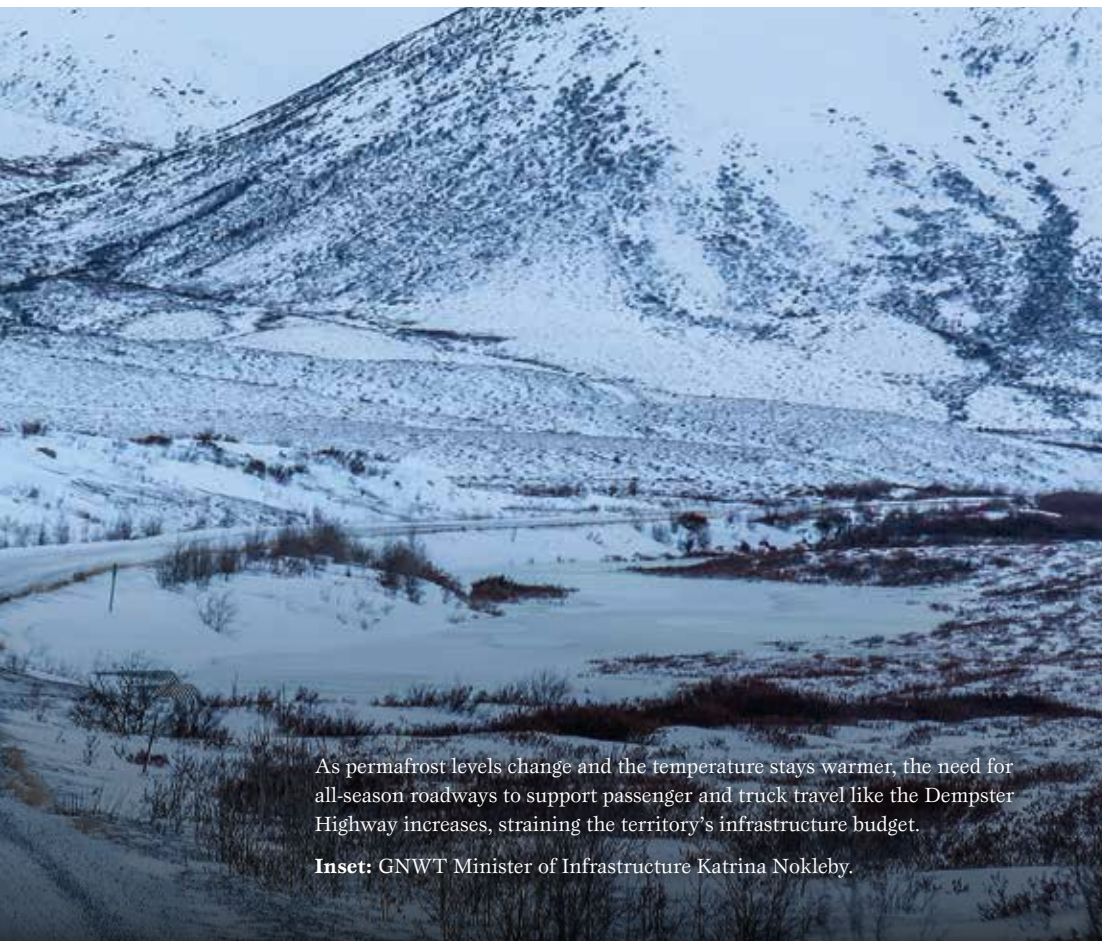
and our big projects to actually increase the skill sets of workers in the north.

We are already starting to see that with new projects such as the Tlicho All-Season Road. Is this a sign of things to come?

I think you can expect to see that a lot more of our contracting will come out with more [questions around] what's your training component, what is your socio-economic benefits that you are going to bring?

We do have really good IBAs [Impact Benefit Agreement] between the mines and the groups themselves and then we do the socio-economic ones between the government and those industries. But actually having them be more than a little bit of lip service [...], let's have it be a tangible skill set that we pass on so that we can have capacity for other projects. And then as well the Indigenous groups can then start to get ownership of their own projects and they have their own people that can work on those projects.

Another thing that we are looking at is a polytechnic university in the north. We have a college right now that is mostly trades focused, but we would like to see some sort of transition into some sort of an earth-sciences-based university where we could be doing permafrost research. But what for me is really exciting about that



As permafrost levels change and the temperature stays warmer, the need for all-season roadways to support passenger and truck travel like the Dempster Highway increases, straining the territory's infrastructure budget.

Inset: GNWT Minister of Infrastructure Katrina Nokleby.

getting the kids up to go to school. And that was something that had never really occurred to me to think about that. But even having a job is going to mean that somebody is getting up in the morning and they are going to get their child up to go to school.

I really want to see empowering workers in the communities so that they're feeling more pride in themselves and then they can be the drivers.

There is also a great need for you to address energy needs: getting communities off of diesel as soon as possible. What work are you doing to try and appreciate the energy solution for each of the individual communities?

We definitely have to be very community-specific when we're looking. One-size-fits-all does not work in the north. We have a vastly different physical environment from where we are at the border up to Tuktoyaktuk.

We do need to work on Talston. The mines themselves say that they know they have a PR issue and that they want to have sustainable mining. They want us to expand Talston because they would like us to run those cables up into our mineral-rich areas. So I see that as being something that needs to happen. That could also mean running submarine cables to Yellowknife, take care of Yellowknife's issue.

But then I think when we get into some of the other more remote communities, we would have to be looking at something else. LNG is one option we're exploring. We have a well in Norman Wells that has gone wet so right now they are bringing up propane from the south to power things and that's not very economical and not very greenhouse gas friendly. I think we are going to have to be very flexible and adaptable to whatever the different specific needs are.

Another area we are looking at is run-of-river hydro, little mini hydro plants if it meets that community's needs. But I think they are going to be hybrid systems for the most part. Solar is great in summer in the north, not so good in the winter. Maybe we need to have wind turbines for the winter. So I think we do need to look very community-specific each time.

Thank you to Minister Nokleby for taking the time to sit down with us to discuss infrastructure challenges and opportunities in the Northwest Territories. 🌱

Andrew Macklin is the managing editor of ReNew Canada.

is maybe we would end up with northern and Indigenous engineers, and they would be the decision-makers on projects. [...] I'd like to see them be the drivers of their own projects.

Are there any specific actions you are taking to work with changing foundations caused by inconsistent levels of permafrost throughout the territory?

The federal government just released a standard that had a lot of northern engineers' input on geotechnical investigations in permafrost zones. So now we are seeing the change in the design. Where before maybe they were relying more on the permafrost to provide the foundation support to the piles, we're not really relying on that any more. So you're starting to see that change within the design industry.

But with the government itself what you're seeing in the Tlicho All-Season Road is a good example of that; they had to incorporate a permafrost plan in the design and construction plan. I think that might be something that you see more within our own procurement and contracting is having more requirements on what you're going to do with permafrost. What are you going to do if you come across it and you didn't expect it, even mitigating it or protecting it?

The Inuvik-Tuktoyaktuk Highway is an entirely fill highway. It's very unusual, but it was to protect the permafrost. Because

as soon as you start to dig into permafrost, you are daylighting it and exposing it to warmer temperatures so you start to lose it very rapidly.

With some ice roads being reliable for months less than previous years, it seems like you're being forced to make the construction of all-season roads a greater priority. How are you adjusting to the greater demand for permanent transportation routes?

For me, one of the biggest things I see as my job to do is to show the linkage between infrastructure to [other MLAs'] social issues, and not make it an either/or situation, but rather show how our deficit of infrastructure is impacting our social issues. One of the people said: it's not just about the economy and jobs, it has to be about social stuff. I said 'if you've all the sudden got one of those mines shutting down and 400 Yellowknife-Dene are out of work, you don't think things are going to be impacting your social issues? Showing that, by spurring our economy, which we can do through these infrastructure projects, we keep people working. We keep people off of assistance. We keep people with a reason to get up in the morning.

It was a really eye-opening experience for me with one of the community MLAs said to me. They were talking about education and such and they said: when parents aren't getting up to go to work, there is nobody



PRIORITIZING AGING ASSETS

Addressing the challenges of decades-old infrastructure. *By Andrew Macklin*

Governments across Canada continue to commit record levels of investment towards building new infrastructure to help support community growth, meet modern demand, and replace crumbling assets.

But in the rush to erect new hospitals, expand highways, and build new transit systems, one class of assets has, for the most part, been left behind: aging assets. These are the assets that, while not yet ready to be replaced, need a plan for how to keep them thriving for the communities they serve.

ReNew Canada, with support from KPMG, hosted an industry roundtable discussion to try and determine the issues that are preventing us from planning, funding, and re-developing the aging infrastructure assets across the country. We brought together industry stakeholders from across the public sector infrastructure spectrum in an attempt to determine a way forward to ensure that aging

infrastructure assets receive consideration for government investment.

Defining the problem

Decades of under-investment, from all levels of government, has put Canada in a difficult position. Infrastructure assets were strained, pushed over-capacity due to driving expansion of cities. And as our focus has shifted to building assets to meet the growing demand, the assets that are strained continue to age, in need of investment to continue to serve the community. But in most cases, the only funding available to these is the bare minimum for asset management in a municipal budget, creating a need for band-aid solutions just to make them barely serviceable year-to-year.

The focus of infrastructure investment, at both the provincial and federal level, has been new projects and expansion projects. Both have a series of grants and funds that can be applied to in order to help provide

funding to increase capacity in a given community. Asset owners apply, hope they receive funds, dedicated some of their own dollars to the project, finish procurement, get shovels in the ground, and then get the thing built. There are no funds to pay for the wear and tear to current assets that bear the brunt of activity while the new asset is being built, nor are there operations and maintenance (O&M) dollars to support the asset once it has been built.

Herein lies the problem. The asset owner has to account for 100 per cent of the O&M funds (unless the project is a public-private partnership that at least takes into account those costs for the first 20-30 years of the asset's life). The asset owner must bear the brunt of decades of O&M, regardless of the asset class or level of asset use. Few asset owners have the ability to meet those cost demands, especially as they struggle with current O&M demands. Proactive maintenance of newer assets becomes a

Aging infrastructure assets have become difficult to fund as government at all levels prioritize the development of new projects.

The difficulty with securing infrastructure investment in the health care sector is that donors are more inclined to support equipment purchases and overall patient care, even when infrastructure funding is desperately needed.

To best target energy investment, the waterpower industry needs a clear signal from the government on whether or not additional energy capacity is needed in the medium and long-term.

near-impossible cost to bear. And in the rare case where funding does become available for such activities, the instability of the funds makes it impossible to properly budget for it on an annual basis.

As budgets for annual asset maintenance stay static, or increase marginally, the priorities for spending that money can change rapidly. A greater number of freeze-thaw cycles in a given winter can wreak havoc on roadways, increasing the expense needed for repair. Pipes will burst, powerlines will break, buildings will flood, and even the best fiscal projections on the cost of those repairs still can leave you thousands short.

But without that funding, assets can become stranded. Unable to pay the cost of repair, owners sometimes must just walk away, leaving the asset to become someone else's problem years later. This is especially the case with assets like dams, buildings, and recreation facilities, where the inability to invest substantially in rehabilitation makes the asset no longer usable by anyone.

There is an important issue that can significantly impact the ability to proactively

maintain an asset: project construction overruns. Even when an asset owner is able to do their due diligence and raise/borrow a sum of money that both addresses the project construction and provides funding for O&M, project overruns can quickly deplete that financial base.

Both new assets, and existing assets, need a greater strategy for addressing the short-, medium-, and long-term operations and maintenance needs in order to ensure an asset stays viable for all those who depend on its ability to function.

No one-size-fits-all available

While there is some commonality to the challenges faced, especially in regards to the issue of finding real funding for O&M, the individual sectors also encounter challenges that are unique to them.

As was pointed out during our discussion by Sunnybrook Health Sciences Centre CAO Michael Young, it can be a real challenge for the sector to raise internal funds for infrastructure, especially on the rehabilitation of aging assets. Understandably, donors often see patient

care or research and development as priorities for campaigns to raise funds or annual endowments. As a result, even when the situation calls for significant investment in rehabilitating health care assets, the only real route for that funding is as part of the annual budget.

Anna-Raphaelle Audouin, president and CEO of WaterPower Canada, noted that one of the challenges that industry faces is the need to understand whether or not to invest in order to boost capacity. While there is much discussion on the need to increase energy output from sustainable sources for things like the electrification of the vehicle sector, there has been no concrete commitment by the federal government to do so. Right now, producers will look to just refurbish their assets without that commitment, rather than adding capacity at a time when it would be cost-effective to do so. It is not a sensible business decision to add capacity on a hunch that capacity will be needed, or needed but not with a clear timeline in place. In order to ensure ratepayers do not bear the brunt of unnecessary costs for energy production that has no end user,

production that costs additional millions of dollars to put into place.

In the water sector, the challenge comes with changing standards impacting by emerging contaminants. As the health sector gains a greater appreciation for the impact of the concentration of certain chemicals in the water, changing standards for the acceptable level of those chemicals can trigger a significant investment for water utilities and municipalities, an investment not always supported with government funding. That capital expense can pull money away from asset maintenance or from capital set aside for water asset replacement.

Providing the necessary tools

In order to evaluate the needs for investment in aging assets, there first needs to be a defined system for evaluation. Asset management programming has begun to put some of these tools in place, but there is not yet a system for the universal evaluation of the structural quality of the different asset classes.

Standardized tools for asset evaluation, not just provincially but nationally, are key to providing a level playing field for which new forms of funding can be developed.

The funding solutions cannot be provided without giving asset owners the tools to evaluate the best long-term solution. It's easy to find the political will to spend on the shiny new asset when that's the only funding pot available, but what if it isn't the best investment? What if refurbishment, rehabilitation, or even expansion are the better option. As Young pointed out during the conversation, you're not going to add a third floor to a rotted foundation. But, if the foundation is strong, the most cost-effective solution may be to add that third floor rather than a whole new health facility.

Standardized tools for asset evaluation, not just provincially but nationally, are key to providing a level playing field for which new forms of funding can be developed. Because addressing the aging assets issue isn't just about finding more money for operations and maintenance, it's ensuring that the money made available is being spent in the most cost-effective way possible. That can't happen if an asset owner doesn't have the standardized tools for evaluation. These tools include standards for understanding the state of disrepair, the root causes for the damage, secondary factors that have

exacerbated the issue and to what degree, and the real long-term costs of maintenance versus rehabilitation versus replacement.

As was pointed out by David Morley, who is the group head of corporate affairs, policy and communications for the Canada Infrastructure Bank, there is a need for, at worst, a set of guiding principles that can help asset owners understand whether to rehabilitate what exists or build new. But this needs to be done using an evidence-based decision-making process that is removed from the impacts of the political cycle. The desire for ribbon-cuttings or pet projects can otherwise derail the more financially-sound investment decision.

With the tools in place, the economic case for how to proceed with asset maintenance can be established. As was pointed out by Michael Klubel, KPMG's national industry leader for infrastructure, government and healthcare, sustainability has to be considered as part of the aging asset strategy; building the business case for an investment

and how that investment can meet asset sustainability targets.

A different model for government investment

With a universal system for asset evaluation in place, one that provides an economic case for short-, medium-, and long-term investment, new provincial, territorial, and federal investment regimes can be created.

Federal government regimes have focused on 'shovel-ready' projects, a funding system that may not be the best for ensuring that infrastructure investments are made in the most fiscally-responsible manner. Instead, using the universal asset evaluation tools available, a new funding system could be developed that could be based on the overall need for investment based on the economic case presented. This could be done sector-by-sector, by asset owner, or by offering a stable amount of annual funding to address the most pressing needs. After all, sustainable funding is one of the key issues facing asset owners, and being given a stable amount of money to address demonstrated infrastructure needs would allow for asset owner to better plan their investment.

At the provincial level, a universal system for asset evaluation could better clarify infrastructure grants targeted at a given sector. For example, the Government of Ontario currently has the Health Infrastructure Renewal Fund in place, which provides close to \$200 million to be utilized by health care asset owners. However, under its current construction, no one facility can apply to receive anything more than \$10 million, a relative drop-in-the-bucket when appreciating the cost of renewal of existing health care assets. With a universal system of asset evaluation in place, that fund could potentially target its investment in a way that better addresses the real needs for infrastructure renewal within the provincial health care system.

Representatives from the Ontario Clean Water Agency that participated in the conversation suggested that there may be another tool that can improve investment at the municipal level: community engagement. There is value to having councillors, mayors/regional chairs, and municipal C-suite staff visit infrastructure assets like wastewater treatment plants to understand what goes into the disposal of wastewater or the delivery of clean water, and the costs that are associated with the delivery of the services. This can apply to other asset classes as well, such as health care facilities, sports and recreation assets, and government buildings to ensure they can appreciate where the dollars are spent, and why there may be the need for greater investment to deliver services to the publics they serve.

As governments at all levels look for better ways to target infrastructure investments to ensure 'the most bang for the buck', especially in the economic recovery phase post-COVID-19, the rehabilitation of aging assets is a smart way to spend money that will have a positive long-term impacts on the communities they serve. Alberta has already seen the value in such an investment, announcing it would double funding for its capital maintenance and renewal program for 2020-21. And while other provinces and territories may follow suit, there is still a need to look beyond the short-term investment, ensuring that all assets have the funding needed to ensure that they continue to stay functional for those who rely on them. Doing so with take new methods of evaluation, new systems for funding, and a new appreciation for why funding these assets properly is so vital for everyone. ✪

Andrew Macklin is the managing editor of ReNew Canada.

What's Holding Us Back FROM REPLACING LEAD PIPE INFRASTRUCTURE?

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REPLACING LEAD INFRASTRUCTURE

Replacing lead pipe infrastructure is part of municipalities' asset management plans. But it should it be a greater priority based on its potential impacts on human health?

A deep dive into the issues surrounding lead infrastructure replacement.

By Andrew Macklin

In March 2019, Health Canada released a guideline on the maximum allowable concentration (MAC) of lead that is safe to be in Canada's drinking water, cutting the previous acceptable level in half, from 0.01mg/L to 0.005mg/L. Eight months later, a group of journalists from across Canada released a scathing series of reports, based on a year-long investigation, on the levels of lead found in drinking water across the country.

When the media reports were released, the focus was on the level of lead in the drinking water and the impact on human health, but provided very little in terms of solutions, save for the odd reporter who discussed the cost of lead line replacement. The testing methodology use by the reporters was erratic. And in many cases, the media reports that tried to 'educate' the public on the lead levels had not bothered to report on the changing of the guideline several months earlier.

As a result, ReNew Canada, alongside its sister publication Water Canada, decided to convene a national roundtable to discuss the impacts of the reporting on the issue, how it has changed public perception on the need to replace lead-based infrastructure,

but most importantly, the actions that can be taken to reduce, or eliminate, lead from our water system. The roundtable featured industry leaders from the technology, consulting, contractor, association, and academic landscape (see sidebar for a full list of participants).

Setting the context

Lead has not been used in the creation of water infrastructure for several decades. In 1975, the Plumbing Code of Canada was changed to prohibit the use of lead for pipes or connections. Cities built in the past 40-50 years have little to no lead infrastructure to be concerned with.

The MAC for lead, the previous mark of 0.01mg/L, was set back in 1992. When the updated Health Canada guideline was released in 2019, it did not take into account any of the impacts of a reduced standard for lead concentration in water. Health Canada guidelines never do. They solely focus on what is acceptable in the context of protecting human health.

According to Robert Haller, the executive director of the Canadian Water and

Wastewater Association, discussions were held with the federal government in the lead up to the change in the guideline. The conversations focused on what could be done to help support the need to remove lead infrastructure in Canada. The ideas thrown around included dedicated infrastructure funds for communities that demonstrated the need for lead replacement, programs to help offset the cost to the homeowner for lead pipe removal similar to that of energy retrofit grants that have been offered previously, and the need to have pipes replaced at the time of the sale of a home in order to have the home insured, similar to what is done with knob and tube wiring.

The result of those discussions was, sadly, nothing. The government officials heard the suggestions from industry stakeholders, but chose not to provide any type of dedicated funding to deal with the issue.

It's not as if nothing is being done to replace lead-based infrastructure. Most cities already have a replacement system in place as part of annual infrastructure asset management budgets involving work on water mains. And, where possible, lead lines are replaced

in tandem with work on roads where the pipes are dug up and exposed anyways as part reconstruction efforts. There is no government mandate that states that municipalities and/or private landowners have to replace lead infrastructure on a given property just because they are aware of its existence.

The challenges

There are several challenges associated with the removal of lead infrastructure, but let's start with the one stated in the previous sentence.

None of the three levels of government has a mandatory replacement policy in place. As mentioned earlier, lead pipes are replaced as part of municipal asset management, to the property line, but the length of pipe from the property line to the home or business is the responsibility of the individual property owner. The cost of the that replacement, for the property owner, was estimated at approximately \$4000-\$6000 based on the information from the experts in the room. And there are no programs, at the provincial or federal level, to help mitigate the cost of the replacement for the property owner, although some municipalities do offer assistance.

But before you can think about replacing the pipe, you have to be able to locate it, and that can be a significant challenge for municipalities. Few, if any, have records dating far enough into the past to understand where lines were installed using lead pipes, service lines, solder or joints. Unless a leak has been detected, a road is being ripped up, a house is being torn down and excavated, or a line is being replaced through general asset management, finding the location of the lead can be difficult. There is technology available now that offers predictive modelling using whatever data is available, but that still isn't a guarantee.

Then there is the homeowner, and their willingness to have someone enter their home to check for lead pipes/connections, or test their drinking water for lead. Even in this instance, where the knowledge of lead levels could help improve their health, there is a reluctance. Among the reasons discussed were the cost impacts of the testing (if lines have to be replaced or filtration systems installed), and complacency over health impacts (I'm not sick so why do I want to bother).

Even if you can access the home, what testing methodology do you use, because there isn't widespread agreement on that either. The revised Health Canada guideline includes two recommended testing procedures, random daytime sampling and 30-minute stagnation sampling. But the U.S. EPA (Environmental Protection Agency), not to mention a plethora of Canadian municipalities, use differing methodologies



One of the issues that need to be settled surrounds testing. Standardized testing could lead to standardized funding, providing government support for lead concentrations at a particular level.

for testing for lead. And, as noted by Director of the Americas Water Quality Technical Practice at AECOM Quirien Muylwyk, it also depends on what you are testing for.

There is also an issue with public perception and understanding. As mentioned earlier, few media outlets, if any, reported on the change to the MAC for lead as the time the new guideline was released. Whether that is a fault of the media or a fault of Health Canada is a discussion for another day, but it's important to note that very few Canadians would be aware of the change to the lead guideline. Secondly, what is the quantifiable risk to the homeowner who has lead within their tap water? If the risk is severe, then you would expect Health Canada to take the lead in ensuring that the removal of lead infrastructure is a national priority back by government funding. But it hasn't. So why would a homeowner commit thousands of dollars the replacement.

Another thing to consider. Ontario Water Works Association Executive Director Michele Grenier mentioned The Canadian Health Measures Survey. When new survey data was released, just nine days after the year-long lead investigation became news across Canada, it showed that lead levels were the lowest they have ever been in children in Canada, even lower than what was expected. This was not communicated to the public, even after the heightened awareness of the issue that had come to fruition just the week before.

And lastly, there are considerations around resources and timing. According to

WE WOULD LIKE TO THANK THE INDUSTRY PROFESSIONALS WHO JOINED US FOR OUR LEAD INFRASTRUCTURE ROUNDTABLE

Robert Haller, CWWA

Michele Grenier, OWWA

William Fernandes,
Toronto Water

Dr. Stephen Craik, Epcor

Quirien Muylwyk, AECOM

Giovanni Cautillo, OSWCA

Nick Reid,
Ryerson Urban Water

Shawn McKaigue,
Fer-Pal Infrastructure

Simon Horsley, Stantec

Andy Manahan, RCCAO

David Mutombo, Hatch

David Roy, Flow Infrastructure

Cameron Manners,
Flow Infrastructure

Sashen Guneratna,
Canada Infrastructure Bank

Anthony Di Battista,
Clearway Construction

Jon Grant, Eris

the reporting conducted in November, there are an estimated 30,000 lead service lines just in the City of Toronto. If, as a result of the new lead guideline that was put in place, the city had to prioritize the replacement of lead service lines over other activities, what are the realities from the standpoint of cost, equipment availability, human resources, and timing? And how would such a commitment of resources impact a city's ability to address additional needs as outlined in their asset management plans.

The solutions

The second half of the discussion started with a simple question: should we commit to replace all lead infrastructure. Full stop. A simple question, but definitely not an easy question.

To start, there is no one-size-fits-all solution for the reduction of removing of lead infrastructure. It isn't just to simply go to every water line and every home, rip out anything with lead, replace it with a newer technology and walk away. It isn't a realistic solution from an economic standpoint or an asset management standpoint.

In basic terms, there are four key points that emerged from our discussion that can

build towards a solution for reducing or removing lead infrastructure:

- Identify the problem.
- Standardize the testing so that everyone is using similar data.
- Recognize the party who has responsibility to address the problem, and give them the tools to address it.
- Understand the options available and the associated risks/liabilities.

Identify the problem

There are two players involved in identifying the problem: the municipality and the property owner.

Municipalities need to have an appreciation of where lead resides with the city-wide water infrastructure. Part of this information is already managed through existing asset management plans. However, communities also need to dig back through decades-old documentation to identify where lead infrastructure has been placed. Predictive modelling can also be used to help identify where this infrastructure exists. But in order to build a successful short-term and long-term plan of attack for replacing lead

infrastructure, you need to work to identify and appreciate where it is, how old it is, and what condition it likely is in.

From a property owner perspective, it is important to understand the likelihood (for unseen assets) of lead pipe infrastructure to be present in the water system running from the property line to the building. If there is the potential for a future cost associated with the property because of lead infrastructure, it makes good sense to appreciate all aspects of the property you own.

Standardize the testing

As noted by at least one participant during the discussion, the more important element of the new guideline may have been the recommendations on testing methodologies, not the changing of the MAC.

By using a standard set of tests, we can appreciate the criticality of the lead issue, which allows both the homeowner and the municipality to best understand how, and most importantly when, the issue needs to be addressed. Like any municipal infrastructure asset, prioritizing is key to using available funds in the most responsible way possible. And for the homeowner, this allows them to

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make a conscious decision on how best to address the issue. But before we do that...

Provide tools to support

This is where the provincial and federal government can best support the need to eliminate lead infrastructure, by providing funding to help communities and property owners offset the cost of lead infrastructure replacement.

On the municipal side of the equation, this could be an opportunity for government infrastructure funds to cover the cost of lead infrastructure where multiple homes have tested over a certain mg/L benchmark.

On the property owner side, having a grant system or tax credit in place, much like the ones previously done to address energy efficiency in the home, would allow property owners an incentive to remove the lead infrastructure entirely rather than having to settle for a short-term fix.

There is also a need for government to step in to address health equity concerns associated with lead. This involves the need to remove lead piping in affected neighbourhoods dominated by low-income housing or affordable housing, ensuring

that those individuals do not suffer negative health impacts based on the inability to pay for the lead infrastructure replacement.

Understand the options, risks, and liabilities

Once a property owner understands the issue, it is important to lay out the options. And not just the city's preferred option, all of the options. What are the short-term, medium-term, and long-term solutions, what are they likely to cost, what programs/grants are available, and how long from that day is it likely to take to implement the solution?

Municipalities also need a tool at their disposal for what happens when a homeowner understands the health risk, but chooses to do nothing. A legally-binding agreement would be best in order to protect the city. But it also has to be something that a property owner can understand without having to consult a lawyer first. Or, perhaps, this is where the provincial or federal government can provide an online resource that helps explain the legal liability of living in a home with unacceptable levels of lead concentration in the water.

It is important that there is public education surrounding health concerns

involved with lead in the water. If Health Canada is going to provide a guideline for the rest of the country to follow, then this should be complimented with public education on why the MAC has been cut, and what it means for human health. Because this did not occur, municipalities across Canada were subjected to an inundation of phone calls from concerned citizens who were scared about lead in their water thanks to the hysteria caused by the national media investigation released last November.

There is no one-size-fits-all solution. That's why it is so important for governments at all levels to work together to build a plan for addressing lead infrastructure in Canada. Provide support to identify where the lead infrastructure can be found, standardize the testing methodologies, put a funding support system in place, and help property owners truly appreciate their options, risks, and liabilities.

By doing so, we can help ensure that lead infrastructure does not continue to be a cause for concern for Canadians. ♣

Andrew Macklin is the managing editor of ReNew Canada.



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The 84-megawatt Pine Falls hydroelectric station is one of 15 hydropower assets owned by Manitoba Hydro, which in total can generate over 5,600 MW of clean power for the province.

Credit: Manitoba Hydro

TUNING UP WATERPOWER

Optimizing existing infrastructure to send more power to the grid. *By Xenia Hébert*

Canada has generated electricity from the kinetic energy of flowing water since the days of the horse and buggy. And while our energy systems have of course utterly transformed since the 19th century, the individual components at the heart of every waterpower station—such as the turbine runner and shaft, and the generator rotor and stator—remain largely similar. With regular care, hundreds of such stations have been reliably and affordably doing their thing, for decade after decade, without so much as a blip.

That said, many of the waterpower stations within Canada's extensive fleet are now entering their golden years. And even the best-cared-for and most durable generating units eventually need a tune up or outright replacement.

"This equipment has a life, like the engine in your car," explains Mike Martelli, Ontario Power Generation's president of renewable generation. Martelli oversees the crown corporation's 66 waterpower stations, with a collective capacity of about 7.5 gigawatts of renewable electricity.

"From time to time, you have to change your car's oil," Martelli says. "But if you keep it long enough, you eventually have to change the engine as well."

Metaphorically speaking, that's exactly what is happening at a number of Canadian hydroelectricity producers. They've embarked upon a series of revitalization

projects to overhaul, replace, and upgrade equipment and infrastructure. In doing so, some are finding hundreds of fresh megawatts, or more, of generation capacity at their existing sites.

As provinces move to introduce climate policies that reduce fossil fuel combustion in electricity generation, transportation, industry, buildings, and elsewhere, they will seek out new power with ultra-low greenhouse gas emissions. Which is, of course, exactly what waterpower offers.

"Almost every Canadian waterpower generator is preparing for the inevitable decarbonisation and electrification of the economy, and examining the opportunity to leverage as much additional capacity as they can from existing waterpower stations," explains Anne-Raphaëlle Audouin, president of WaterPower Canada, the national trade association for hydroelectricity producers in Canada.

"There are thousands of megawatts of potential new waterpower generation capacity waiting to be harnessed in Canada, just from refurbishing and redeveloping existing generation units and sites," added Audouin. "The additional hydroelectricity produced can be delivered at a lower cost than most—if not all—other options for new supply."

Ontario retools its fleet

Ontario Power Generation (OPG) serves roughly half of the province's electricity

load. A good number of its 66 waterpower stations came online in the 1950s; many are more than a hundred years old.

That's the case with Ranney Falls, a small early-20th century station on the Trent River, which flows into Lake Ontario. Following a system-wide assessment, OPG opted to expand the facility to produce more power from the same site, explains Martelli. The utility extended the existing dam by 40 feet and built a new powerhouse—and, in doing so, literally doubled the generation capacity at the site.

A new hydroelectric turbine runner boosted Ranney Falls' total capacity from 10 to 20 megawatts; the original powerhouse still hosts two original five-megawatt generating units that date to 1922. After receiving upgrades in 2006, they're still going strong and will continue to do so, long into the future.

"The beauty and the benefit of these improvements is that we're getting more energy and capacity from the same water. We are not disturbing the environment, we're making use of existing infrastructure and technology improvements to squeeze out more energy," says Martelli.

Martelli reckons that the company has achieved an impressive additional 600 megawatts of capacity at existing sites in the past 20 years, and there's more to come: "I suspect there is at least another 500 megawatts out there waiting to be harvested in Ontario."

Manitoba pours on the power

In 1914, the Winnipeg Electric Railway company began building the Great Falls Generating Station on the Winnipeg River to supply juice to its streetcar network. After a pause in construction following Canada's entry into World War I, the power plant's generator units first began humming in 1923. Today, it's one of the Crown utility's oldest generating stations and is still providing valuable service.

The utility began an overhaul program more than 30 years ago, explains Manitoba Hydro spokesperson Bruce Owen. "Some of our plants could be described as 'legacy,' and replacing these units, either in part or in whole, gives us an opportunity to introduce modern equipment that increases the amount of electricity we generate, while also keeping things safe for our staff."

In the case of Great Falls station, Manitoba Hydro ordered new, more efficient turbine components to be designed and manufactured to fit the exact available space. It also installed new power transformers to handle the increased generation capacity.

More recently, Manitoba Hydro removed and replaced unit four's original draft tube liner, a tube mounted at the exit of a runner that receives water after passing through the turbine. The utility replaced the original unit with a higher-output turbine runner and components.

"There are thousands of megawatts of potential new waterpower generation capacity waiting to be harnessed in Canada." — Anna-Raphaelle Audouin

"The work required us to cut and extract 10 sections of unit four's draft tube liner, each 30,000 pounds, via overhead crane, and replace it, too," says Owen.

The overhaul extended unit four's life by another 40 to 50 years, and increased power output capacity by 30 per cent, from 20 to 26 megawatts. Manitoba Hydro did similar work on unit three at Great Falls about a decade ago, increasing its output by approximately 16 per cent.

Some refurbishments call for only modest teams and equipment. Others are daunting, such as installing new turbine runners at Kelsey Generating Station, on the Nelson River, about 90 kilometers northeast of Thompson.

Manitoba Hydro built Kelsey to supply electricity to Thompson, and to mining and

smelting operations in the area. The utility connected the generating station to the province's electrical system in 1961, six years after its completion. The rehabilitation job was so extensive that the crown corporation needed to build a 60-person construction camp on site in 2006, prior to work starting.

Five of Kelsey's seven generating units underwent extensive rehabilitation work. The utility installed more efficient turbine runners, replaced steel liners, and rewound the generators' rotor and stator assemblies. The Kelsey overhaul increased the station's capacity by 84 megawatts.

That's the equivalent output of a sizable new waterpower station—except, of course, no new generating station was needed to make it.

Refreshing a piece of Quebec's history

Since 1934, when water first roared through its six massive turbines, the Rapide-Blanc generating station has reliably produced clean and renewable electrons.

In the almost nine decades that have since passed, engineers have fastidiously maintained all of Rapide-Blanc's parts to keep the 209-megawatt station running flawlessly. But eventually, even the best-loved equipment will reach the end of its service life.

Hydro-Québec, a provincial crown utility, is poised to begin a major \$610 million overhaul of Rapide-Blanc. The

project will last seven years, and involve swapping out the station's massive generating units, refurbishing its intake gates, draft tubes, switchgear, control gear, auxiliary mechanical equipment, auxiliary transformers, and the station building.

"Fifty-five per cent of our plants are more than 40 years old," says Simon Racicot-Daignault, Hydro-Québec's Senior Director of Generation and Maintenance. He oversees all of the utility's generating stations and dams.

"We need to be really strategic to make sure we invest at the right time. That is going to become more and more important with the decarbonization of the grids in the United States Northeast underway," he says.

Racicot-Daignault says that reliability is a key factor when deciding which stations to work on next. "We have a very rigorous

diagnostics program, every single asset is frequently evaluated by our team," he says. "Reliability is really key for us, especially in today's world with the energy transition ongoing and the coming of new renewable sources."

Racicot-Daignault believes waterpower will play a key role in decarbonization, because other renewable energy resources are variable.

Of course, the dollars and cents need to add up as well. "When we have an aging fleet like ours, we need to be confident we can do the refurbishments and still produce electricity at the same price," said Racicot-Daignault.

Hydro-Québec has completed preliminary work at Rapide-Blanc; the big job is now underway and will continue through to 2026. Les Québécois consider their crown utility something of a provincial treasure, and widely regard Rapide-Blanc as an important heritage asset.

The Rapide-Blanc project is the current focus of what will be at least a decade of refurbishments and upgrades around the entire Hydro-Québec system; the utility will complete the last of the current wave of projects around 2022.

And for all of them, the utility will be keeping social license front-of-mind. "We always look at the social acceptability of a given proposal," Racicot-Daignault notes. "If you are [going to be] putting more water through a station, you need to make sure you have the social license to do so."

Hydro-Québec has long partnered with the Cree in the James Bay region. "When we do an expansion, it is always in conjunction with the Indigenous people," says Racicot-Daignault. "We are on their territory, and need to agree on how we do it, and how we are going to treat the river."

The utility doesn't necessarily plan on building new green field generating stations for the foreseeable future; investments in existing plants tops the list. Decisions regarding the need for more power production will be made around 2022, in accordance with local and export demand.

Meanwhile, there is a lot of work ahead, and nobody will even know it's underway. "Ideally, you would never stop the turbine units," says Racicot-Daignault. "As long as you run, life is good." ♣



Xenia Hébert is the communications and event coordinator at Waterpower Canada.



Designing resilient infrastructure for future cities.

By Michelle Albert, Elliott Cappell, and Elise Paré

Forest fires, flash flooding, ice storms and extreme heat aren't just the stuff of a good disaster movie. In Canada, these extreme weather events are an unfortunate reality—and an omnipresent threat to our built environment.

As the impacts of climate change become increasingly prevalent, there is a heightened need to adapt our infrastructure to build resilience against intense conditions. Building that resilience comes with a price tag—in fact, the latest analysis we have suggests there will be a \$5 billion need each year for municipalities to adapt their infrastructure to climate change.

At the moment, about two-thirds of the infrastructure we use in our day to day lives is owned and managed by municipalities. This infrastructure is already facing significant funding gaps, and the higher design standards needed to be resilient against climate change won't be cheap. How can we adapt to these challenges and design cities that are both sustainable tomorrow, and financially feasible today?

Making the investment

In the vast majority of Canadian cities, we are already facing a significant infrastructure

funding gap. From the municipalities' perspective, calling for big additional investments on top of that gap can seem overwhelming. Similarly, overwhelming seems the long list of investment priorities, like replacing aging water mains, building deeper culverts, or higher seawalls—and the question of what to tackle first. When even meeting end of service life replacement needs is a challenging, going beyond that and building something that exceeds minimum design standards or codes can be a tough sell.

Yet investing in resilient infrastructure is not nearly as daunting as it may initially seem. Firstly, through evolving asset management practices, many municipalities have developed a strong sense of what their replacement and rehabilitation priorities should be. And second? Building future ready infrastructure doesn't necessarily have to be more expensive.

If you're looking to replace like for like, then absolutely it's more expensive that way. However, climate change is encouraging designers to think outside the box and do things differently.

In many cases, there are emerging, innovative ways to rehabilitate existing infrastructure or build new options, that can

save on costs both immediately and over the longer-term.

It's a matter of more thoughtful design.

Tools for the job

Besides finding clever ways of trimming costs, budgets and funding aren't the only tools a municipality has to build more resilient infrastructure. Legal, policy and risk management tools are also available—and can be highly effective.

One example of this is using subdivision servicing bylaws, which govern many infrastructure designs.

The Columbia Basin Trust funded the development of a climate-resilient servicing bylaw template. Other communities could use it to find examples of how to rewrite their subdivision servicing bylaws to include climate resilience. That's one area where municipalities have some control.

However, even with bylaws as a roadmap, delivering this infrastructure will still require a case-by-case approach. For instance, a municipality might use an analytical modelling tool to predict the amount of rainfall a specific area might experience in the future under climate change parameters. The city might then plan for different



As we build infrastructure megaprojects meant to last for decades, we must design the asset in a way that will meet the climate considerations of the future.

exercise than a thoughtful, carefully considered part of the design process. However, if a city sees the overall benefit this exercise can bring to the organization, it really can encourage collaboration between municipal departments.

Delivering solutions

Thoughtful and cost-effective design, alternative tools, capacity building and collaboration can be a highly potent combination to deliver these resilient infrastructure solutions. And we're already seeing some exciting examples emerging of how this can be done well.

Many municipalities are integrating climate resilience into their strategic planning. We just worked with the City of Coquitlam to develop an overarching climate adaptation strategic plan which will in turn be used to as a framework to integrate resilience into for new policies, plans and practices. It was a true multi-departmental collaboration.

A key player in this collaboration is the CFO. We need to measure and disclosure our climate financial risk, connecting it to sustainable finance, new forms of insurance, and finally making the case that sustainable infrastructure is an investment, not a cost.

Another thing we're seeing is that people are becoming more open to modular and multifunctional design. For instance, using parking lots, park space or transportation corridors that double as a flood defense is one way to combine standard, pre-existing infrastructure that we'd invest in anyway with innovative new uses.

This is going to take a paradigm shift and a lot of collaboration, and business isn't going to function as usual.

Building more climate resilient infrastructure will make us all better designers and better engineers, because you're thinking about multiple different options. I think in the past we've just sat on our hands and said, 'that's what the standard is'—but we can't do it like that anymore. ♣



Michelle Albert is the director of water and wastewater at WSP Canada. Elliott Cappell is the director of climate change and resilience at WSP Canada. Elise Paré is a senior project manager and climate resilience advisor at WSP Canada.

scenarios of rainfall intensity, and use risk management planning to determine how conservative their approach should be based on its consequences for that area.

For instance, if you have a culvert that would take out a private driveway if it failed, that may not be considered a significant risk. But if it would take out the only access road to a hospital, that increases the risk profile. So, you want to use tools that consider a variety of factors in your risk management approach.

This case-by-case design approach makes people less comfortable, because they want a very structured roadmap. It's not going to work that way.

There is a large degree of uncertainty right now, as the resilience conversation is an evolution in the industry. A big priority for municipalities will be building capacity to have these conversations, and act on them.

Capacity and collaboration

Capacity building will be another critical tool for the most forward-thinking municipalities, and one that can be a challenge for departments that are already stretched.

From a water conservation point of view, We've worked with many different municipalities and all of them are challenged to keep pace with imminent issues, like fixing a watermain break. You add in

climate resilience, and they don't always feel they have capacity to prepare for these changes. They are pressured to work with fewer tax dollars, especially in smaller rural communities. So the ability to build capacity in existing organizational structures is very important.

Capacity building raises a crucial conversation around the importance of collaboration. Climate change cuts across departments, so the emphasis cross-functional solutions will ramp up.

As an example, one of the challenges the city of Toronto faced was that the issues were extending beyond the existing asset owners. When it comes to overland or pluvial flooding, it wasn't Toronto water's responsibility anymore, it was also a bit of Toronto planning, Toronto Hydro, private property owners, and the TTC. We got all those departments to sign on to the flood resilience charter. They agreed to take two priority actions together as a group.

Cross-organizational groups should also collaborate on climate lens assessments, which is a report that looks at how the designed infrastructure will interact with climate factors, and the greenhouse gas implications of building new infrastructure. These assessments are required on most federally-funded jobs over \$10 million.

Sometimes, these assessments are viewed as more of a last-minute box-checking



Reliable data helps local leaders better understand infrastructure assets so that they can assess risks, prioritize investments, and determine future needs.

BUILDING STRONGER COMMUNITIES

How municipalities use modern asset management to build better lives.

By Bill Karsten

Strong infrastructure is the lifeblood of our communities. It's the roads and bridges that move people and goods. It's the arenas and recreation centres where our children play. It's the treatment plants that ensure our water is safe to drink. Maintaining this infrastructure means maintaining the quality of life Canadians expect and deserve.

Across the country, managing and expanding that infrastructure falls most often to local governments. Municipalities own 60 per cent of the core infrastructure that supports Canada's economy and quality of life. As the order of government closest to Canadians, municipalities are on the front lines of ensuring that Canada's infrastructure keeps communities going—efficiently and effectively.

Much of this infrastructure is aging. According to the 2019 Canadian Infrastructure Report Card (CIRC)—produced by the Federation of Canadian Municipalities (FCM) and seven partner organizations—40 per cent of Canada's roads and bridges will need urgent upgrades within the decade. With new risks caused by climate change and extreme weather—as well as limited local budgets—the job of

managing our essential infrastructure is getting tougher.

That's why more and more municipalities are turning to modern asset management. By better understanding how to maintain new and existing infrastructure assets throughout their life cycle, local leaders can make better decisions and save money. According to the 2019 CIRC report, 70 per cent of municipalities with 30,000 or more people now have an asset management plan. But in smaller communities—where fiscal tools are limited—that number drops to just 29 per cent.

Making informed infrastructure decisions

Asset management empowers municipalities to make informed decisions about their core infrastructure. The key is having good data. Reliable data helps local leaders better understand infrastructure assets so that they can assess risks, prioritize investments, and determine future needs as communities grow. It means municipalities can identify when a piece of infrastructure is in need of repair—before it breaks down. It means municipalities can ensure new infrastructure projects are built more resilient to climate extremes. And it means municipalities can

assure residents that their money is being spent wisely, with the best information available.

The City of Pembroke, Ontario, knows these benefits well. In 2018, the city received an asset management grant through FCM's Municipal Asset Management Program (MAMP) to assess the condition of its roads. The city used that data to prioritize its roadwork—extending the life of its infrastructure and saving money. To expand on the use of asset management methodology for maintaining and renewing Pembroke's infrastructure, the city has since hired an asset management coordinator to integrate asset management practices into all their decisions.

This success in Pembroke was driven by a commitment from both elected officials and staff to use data to make their infrastructure dollars go further. This collaboration is vital when developing a municipal asset management plan. And while there is no one path to getting started, many municipalities begin by taking an inventory of their assets—from roads to buildings to underground networks, such as sewers and water mains.

Once a community has its inventory, it can begin to determine the condition of its assets. Sometimes that's as simple as an inspection. Sometimes it requires a more

complex analysis. But the key is to keep that information up to date. Modern asset management isn't a one-time endeavour, but rather a long-term approach.

Other communities start more slowly, by applying asset management principles to a single type of infrastructure—say, an arena. That enables municipalities to know when that arena needs repairs. It helps municipalities understand what steps to take to extend its life, or how to make a new arena more resilient to extreme weather. Whether starting big or small, asset management means local leaders can make informed choices at every step of the way—which is what Canadians expect municipalities to do.

Applying for an FCM asset management grant

With limited budgets and competing priorities, developing asset management practices can seem daunting. That's why FCM's MAMP offers funding, training, and resources to help communities begin their asset management process—and to support them as they progress. Since 2017, MAMP has funded more than 585 local asset management projects in communities across Canada. Its also funded 374 training sessions and workshops. The program is run by FCM and funded by the Government of Canada.

MAMP has proven to be so popular and effective that the 2019 federal budget committed an additional \$60 million to the program. Doubling down on this federal-municipal partnership will enable funding support for hundreds more municipal projects, mostly in smaller and rural communities where limited resources make modern asset management more difficult to undertake. It will also encourage communities that will work together to share knowledge or resources.

Municipalities are Canada's builders. With responsibility over so much of our public infrastructure—and with our frontline expertise as the governments closest to daily life—local leaders are building strong, vibrant, and livable communities. That's why having access to the right tools and information at the local level is so important. It's how we're able to build better lives.

To learn more about the asset management resources available through FCM, visit <https://fcm.ca/en/programs/municipal-asset-management-program>. 🌱



Bill Karsten is the president of the Federation of Canadian Municipalities.

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Without proactive investment in water infrastructure maintenance, pipes will eventually break, which can lead to an even greater cost to the municipality.

WAITING ON A CRISIS

Proactive measures are needed for addressing water infrastructure assets.

By Geoff Britnell

Canada's response to the COVID-19 pandemic put our critical infrastructure to the test. One major aspect of that was municipal water systems and its reliability. An industry that has always fought for attention via slogans like “no water, no beer” or “no water, no hockey” changed the message quickly to “no water, no handwashing.”

While COVID-19 is an extreme example, it brings to light the question of the condition of our water infrastructure. A system often neglected because it is ‘out of sight, out of mind’ was thrust into the public eye as an essential service that was needed more than ever. Water system owners and operations were left to hope that systems with 100-year old infrastructure would hold during this essential time. To say that there were more than a few sleepless nights would be an understatement.

One major reason for these sleepless nights was the current water infrastructure backlog that exists within the country. Water systems, which have been repeatedly

underfunded, have suffered from a deferral of maintenance. Aging systems that have been falling apart have been pieced together and asked to hold on long after their useful life is up.

Unfortunately, our water systems are often left to the point where it is too late and the infrastructure gives way before it can be

addressed. To prevent this from occurring, the infrastructure requires investment before the point of failure.

Take for example a water system that has 100 kilometres (km) of watermains that are expected to last 100 years. If the water

infrastructure lasts its full expected lifespan, it would require that one per cent of the watermains are replaced yearly, starting the day it was first installed.

The newly-installed infrastructure isn't expected to require replacement immediately. That leaves the utility owner to save for future years when the infrastructure

would require replacement as more than one per cent would be required to be replaced each year.

Very few utility owners are replacing that one per cent of the water system, and instead are deferring the work and saving it

How do we bring attention to the need to minimize the deferral of maintenance on our water system while still maintaining trust in the water itself?

for future years. This increases the backlog along with the risk of a failure occurring. By the time that watermain requires replacement, five-to-ten per cent may need replacement in a given year, and the funding cannot meet that need.

Solutions aren't easy

Rates need to be raised as the asset ages for the utility owner to be able to replace it when the time comes. Without it, the asset fails and requires an emergency fix to keep the water running. These emergency fixes are expensive and add up quickly.

It is not unusual for utility owners to reach the point where the cost to repair the system cleans out whatever funding has been set aside, leading to a rate increase without any funding designated to a replacement of the asset. The reason it has been allowed to continue like this? Out of sight, out of mind.

Compare this to a public transit example. A city bus is 50-years-old, has a broken window, can only go half speed because the engine is working at half capacity, and may break down a few times before getting to its destination. Compare that to a watermain that is 100-years old, is working at 10 per

cent of its capacity because it has nearly rusted shut, is leaking water constantly and will require several patches due to it breaking. While both are important, what option can you live without?

This chronic underfunding adds to the downward spiral of trust in municipal drinking water. The less funding given to water, the more likely issues are likely to occur, further lessening the trust in water which leads to less consumption, which leads to lower revenue, and therefore further underfunding.

The only way we break this cycle is by increasing the value we place on municipal drinking water and the funding that goes with it. This is not an easy task. It requires significant political support. Rates cannot be increased without political support which funnels down to the voter.

This brings to the surface the difficult question; how do we bring attention to the need to minimize the deferral of maintenance on our water system while still maintaining trust in the water itself? How can a city show a picture of a 100-year old watermain full of holes and rust to the public without the public losing confidence in the

water itself?

It's a difficult question that our public works leaders are left with addressing daily: keep confidence in the system and ensure the reliable delivery of safe clean drinking water.

As a society, we need to do our part in addressing this concern before it is too late. Increasing rates and taxes is not an easy task, especially if the problem is out of sight and out of mind. Rather than kicking the rock down the road to future governments, our current politicians have to take a risk and ask for an increase in rates.

We as a voting populace must support the politicians taking the risk and ask more of the ones who are not.

We can no longer allow for our water systems to deteriorate and presume they will hold together during times of crisis. We can no longer sit on our assets. ♣



Geoff Britnell is the business development manager, North America, for Fer-Pal Infrastructure.



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The ability to carefully control the environment where it is built could cause an increase in the use of modular construction in public sector infrastructure.

INFRASTRUCTURE IN THE AGE OF PANDEMICS

How COVID-19 could change the future of Canadian infrastructure.

By Catherine Doyle and Mark Johnson

As the world continues to feel the rippling effects of coronavirus disease (COVID-19), the response to the crisis both in Canada and abroad has made it increasingly clear that the virus will have a lasting impact upon the global infrastructure community. While it is true that many of the lessons learned from COVID-19 may only become apparent months or years down the road, the early response to the crisis has been such that, in the midst of the mass upheaval society has experienced as a result of the virus, several important themes relevant to the infrastructure industry have emerged.

The challenges faced by governments in the wake of COVID-19 suggest that infrastructure around the world will need to adapt to meet the significant stresses on society posed by future epidemics and pandemics. Early indications are that the following areas will be of focus in planning for infrastructure where managing epidemics and pandemics—including through physical distancing—are at the forefront of the public consciousness and understanding:

Importance of broadband and information technology

While as a class of infrastructure investment, beyond the incumbent telecommunications companies, both broadband and IT infrastructure are relative newcomers, in the wake of COVID-19 they will almost certainly become a core element of infrastructure planning, not only in Canada but globally. Canada's recent experience with physical distancing has shown that constructing communications networks with sufficient geographic coverage, resiliency and redundancy is core to keeping a functioning economy during times of crisis. It is also critical to enabling connections with both educational and social networks during periods where citizens are required to maintain isolation from daily activity patterns. While government planning in these areas has been relatively limited to date, the prospect of rural and less dense populations being critically disadvantaged due to a lack of coverage in future epidemics and pandemics

may accelerate government projects already in the planning stages.

Decentralization and divisibility of core services

While recent infrastructure trends have favored the construction of 'super' hospitals, more mass accelerated transit options and other megaprojects, the advent of COVID-19 suggests that there may be hazards that can result when critical infrastructure is designed to amass large numbers of individuals in one place or through one system. While scales of economy have historically favored the centralization of critical services, and while concentrated live/work locations have been a favored urban planning strategy for some time, the COVID-19 pandemic may force infrastructure planners to consider how such strategies can be implemented without sacrificing the ability to physically distance or isolate users should the need so arise.

Risk management and risk allocation

Managing the risks inherent in both the construction and operation of infrastructure

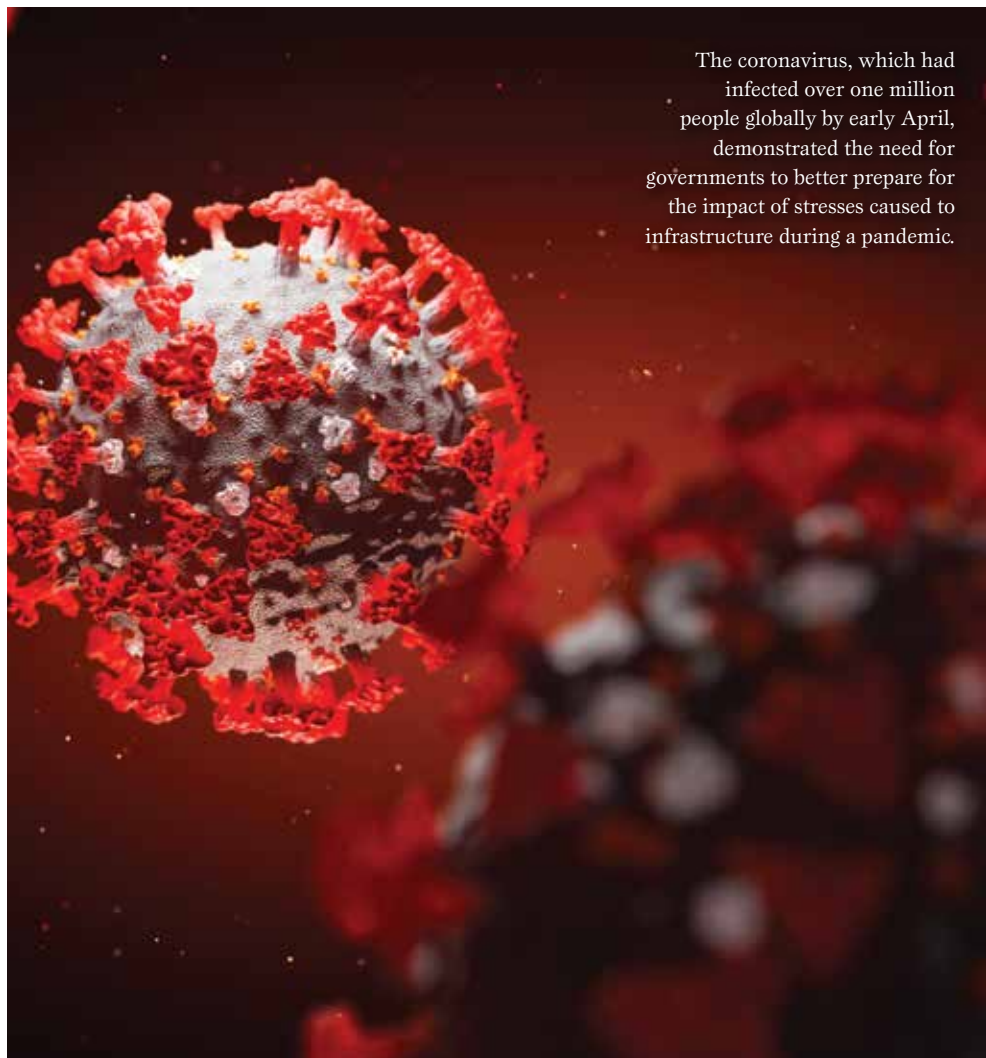
assets during epidemics and pandemics is almost certain to be a near term focus of those involved in the industry. In the face of the current COVID-19 pandemic, infrastructure market participants have in many cases been caught off guard at the lack of specific protection for epidemics or pandemics under existing policies of insurance, construction contracts, services contracts and project agreements. It remains to be seen whether insurance coverage for epidemics or pandemics evolves over time, but in the near-term business may be faced with the fact that the impacts of viruses such as COVID-19 will be excluded from most insurance policies. Accordingly, owners, investors and contractors will all need to pay close attention to future contractual risk allocation for epidemics and pandemics both in the construction and operational term of infrastructure contracts, particularly where epidemics and pandemics could cause delay or inability to meet key performance indicators.

New classes of scientific and medical infrastructure

In the wake of the biological threats posed by COVID-19, the intersection of the medical and infrastructure communities has never been more evident. While traditional bricks and mortar healthcare infrastructure such as hospitals will play a key role in management of all epidemics and pandemics, COVID-19 also highlights an urgent public interest in a thriving and innovative scientific (and associated manufacturing) sector and related distribution channels. While shortages of medical personal protective equipment and sanitation products and devices have featured prominently in the ability of countries, including Canada, to meet the challenges of COVID-19, the timely availability of drugs and vaccines has also propelled the medical industry to the forefront of a public policy discussion on the interface between the scientific community and government. The ability of health care facilities to pivot easily in a crisis, manufacturing facilities to repurpose quickly and supply chains to adapt around them will likely become key elements of their design, licensing and operation.

Modular construction as a differentiator

The move towards modular construction was already gaining steam before COVID-19, but that trend may now accelerate. While the traditional benefits of modular manufacturing remain - off-site manufacturing processes are generally faster and have better quality control than the equivalent building processes on-site - those



The coronavirus, which had infected over one million people globally by early April, demonstrated the need for governments to better prepare for the impact of stresses caused to infrastructure during a pandemic.

benefits take on added importance when responding to epidemics and pandemics. The controlled factory environments in which modular manufacturing occurs permit greater degrees of automation and customization, meaning that they are better suited to managing many of the potential health and safety requirements of epidemics and pandemics. Modular manufacturing is also well suited to repurposing assembly lines quickly, for example to manufacture components for health care facilities.

Evaluating preparedness and flexibility as elements of infrastructure projects

One legacy of COVID-19 may be that readiness and adaptability for future epidemics and pandemics becomes a criteria for future infrastructure investments. This would see infrastructure agencies focus on elements of preparedness and flexibility throughout the infrastructure cycle and ensure that such elements are incorporated into long-term infrastructure planning. In this regard, increased emphasis on modular buildings, decentralized systems and internal redundancies, as well as convertible spaces that can readily be transformed from one use to another may quickly become the norm. While incorporating such elements into a traditional infrastructure plan may be more

costly, that will need to be weighted against the almost certainty that such features will be tested in future pandemics.

It is inevitable that COVID-19 will change the way we think about and plan for infrastructure projects in Canada and around the world. While the global response to the pandemic raises important questions about how both governments and the private sector will execute and manage the risk of taking on traditional infrastructure projects in a future where epidemics and pandemics could be an increasing reality, it will doubtless also be the case that learnings from the response to COVID-19 will impact the nature of future infrastructure itself, whether in terms of technology, housing, healthcare, service delivery or channels of transportation. As a result, COVID-19 will offer challenges to professionals in all aspects of Canada's infrastructure marketplace. 🍁



Catherine Doyle is a partner in the Blakes Infrastructure group. Mark Johnson is also a partner in the Blakes Infrastructure group.



LESSONS FROM ASIA

What we can learn about building better infrastructure from colleagues around the world. *By Stephane Asselin*

The rapid transformation of Asia's economy, which has been powered in part by strong infrastructure investments, has been the envy of many. The Asia I work in today is considerably different to the one I first arrived in, back in 1996. I believe there are lessons for Canada from its modern metros and sky-scraper skylines.

Embracing the new

For an idea of how Asia has changed, compare Singapore, a nation-state smaller than Calgary, Alberta, with the vast territory of Canada. Thirty years ago, the two countries' GDPs were almost equal. In contrast, the IMF has forecasted that Singapore's GDP will stand at 2.03 times more than Canada's by 2021. A key reason has been investment in infrastructure, with Singapore's considered the best in the world.

In other parts of Asia, China is home to

more high-speed rail lines than the rest of the world combined. Vietnam develops more new infrastructure than any other developing areas in Asia Pacific. Hong Kong's Mass Transit Railway (MTR) is one of the world's most profitable and highly-praised metros. This is achieved by implementing an innovative 'rail plus property' business model where the transport network is self-financed, enabling it to deliver social benefits without taxpayer subsidies.

This openness to new thinking and technologies is a major reason why Asia has achieved so much. The same opportunities, and more, are now available to Canada, as the country looks to its own future.

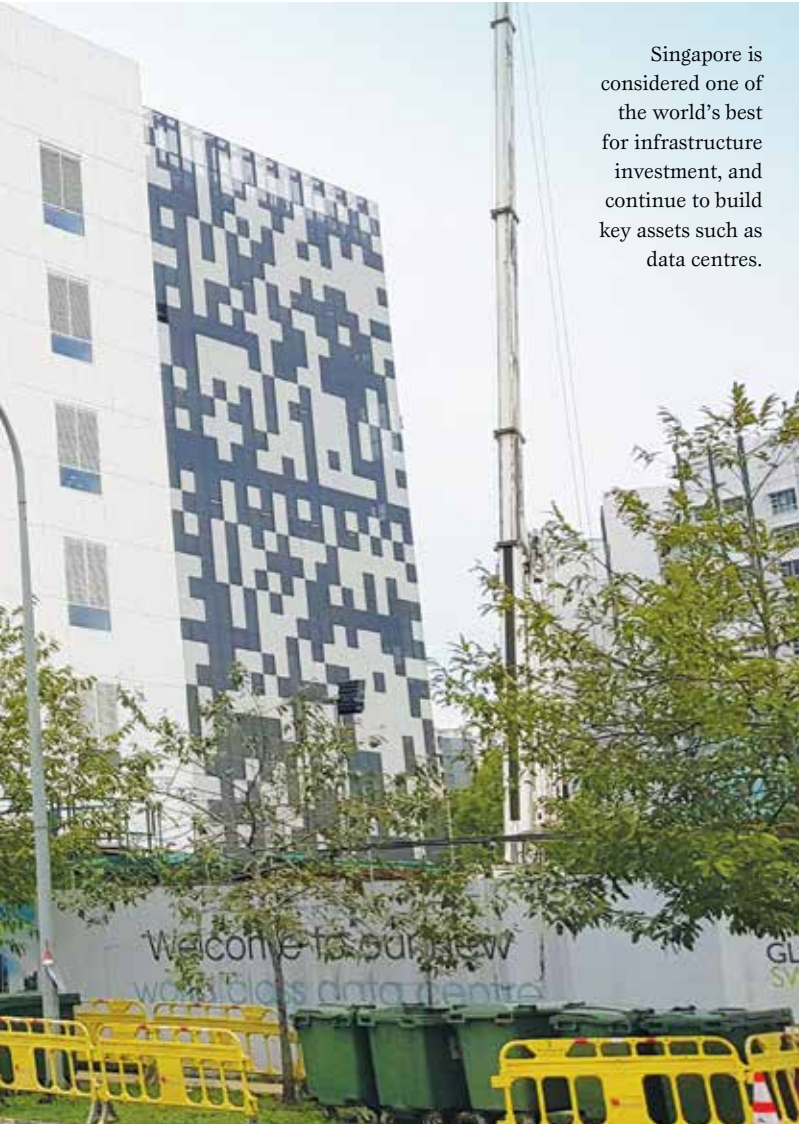
Speed matters

Asia's development has been brisk because the demand is great. It was the need to connect its vast population which drove

China to open its first high speed rail link in 2008 and to build another 27,000 kilometres of new lines over the subsequent decade. Another 11,000 kilometres are currently under construction.

In the late 1960s, Hong Kong needed to build an underwater tunnel, the first of its kind in the region, to address an urgent need for a fast link between the financial and commercial districts on opposite sides of Victoria Harbour. In reaction to high project cost estimates, the Hong Kong government entered its first Public-Private Partnership (PPP), using a business model where contractors can recover their investment, operating and maintenance expenses. Such quick execution meant that only a few years later, in 1972, the Cross-Harbour Tunnel was opened.

An approach to infrastructure where many Asian countries do well is to identify



Singapore is considered one of the world's best for infrastructure investment, and continue to build key assets such as data centres.

CASE STUDY

SINGAPORE'S FIRST LARGE-SCALE PREFAB MEP PROJECT TITLE

Singapore's Construction Industry Transformation Map was developed in 2017 by the government authorities in close partnership with the industry, trade associations and chambers, institutes of higher learning, and unions to improve construction productivity.

Aurecon was involved with the design and construction of a six-storey 25,000 square metre data centre in Singapore, which supports 20 megawatts of critical IT equipment.

Everything from initial plans to completion took only 14 months. Modular design and construction methods reduced the construction period by 10 per cent and trade labour by 70 per cent. Suppliers played their part by organising their supply chains, so construction could proceed smoothly and quickly. Aided by digital design, the project team was able to plan and sequence the delivery and installation of MEP modules.

It is one of the most energy-efficient data centres in Singapore with a final power usage effectiveness (PUE) of 1.34. This compares favourably against the PUE target of 1.78 set by the National Environment Agency of Singapore. 🌱

a problem, then work briskly to create a bespoke, modern solution. It's a pace of innovation which, I think, Canada can look to replicate as it enters the 2020s.

Partnering for progress

Of course, success hasn't been universal. For some Asian countries, it has come at the expense of social and community well-being. Others have been hugely affected by poor future-proofing and the impact of climate change.

Indonesia's capital, Jakarta, faces many problems from rapid urban growth, like gridlocked traffic. The most startling is that alongside flooding risks, Jakarta is sinking into the ground—by 17 centimetres annually—from decades of drawing groundwater. Because of this, the government has been forced to relocate its capital entirely to East Kalimantan that's 1,169 kilometres away.

This outlines the importance of sustainable infrastructure and its socio-economic impact. Fortunately, there are countries who are committed to tackling such challenges. Singapore and Hong Kong are investing \$4.7 billion and \$1.2 billion respectively in the near-term to battle climate change. Vietnam

now leads Southeast Asia's solar photovoltaic market, with the largest installed capacity in the region of 5.5 gigawatts, in a bid to reduce its reliance on coal.

In Canada, the 2019 Canadian Infrastructure Report Card (CIRC) reported nearly 40 per cent of the country's roads and bridges and 30 per cent of mains and sewers are already in fair, poor, or very poor conditions. The situation is urgent. The CIRC authors are calling for long-term, sustainable funding to replace Canada's infrastructure. I agree and believe that businesses, communities, and government must work together to achieve this goal. In Singapore, I've seen how beneficial such government-business collaboration can be, even for smaller projects (see case study).

Canada has all the essential building blocks—some of the world's brightest minds, a wealth of natural resources, a forward-looking government, and a laudable citizen-led, green movement—to replicate Asia's successes.

Furthermore, Canada has developed a successful PPP track record and an infrastructure investment framework which calls for an increased cooperation between Canada and Asia's investors and

corporations. It is the only G7 country to have a state capitalized national infrastructure bank, Canada Infrastructure Bank, whose mandate is to enable the delivery of further transformative infrastructure projects by crowding-in private sector money alongside public funds. Canada is also home to several sophisticated public pension fund investors such as CPP Investment Board, CDPQ, and Ontario Teacher's Pension Plan. They support the development of key infrastructure projects locally and internationally. Both seek co-investment opportunities in sustainable brownfield and greenfield infrastructure projects.

There are many opportunities where infrastructure experts from Asia and Canada can work collaboratively. By pulling together and adopting the best from Asia, we can achieve a sustainable and brighter future for Canada. 🌱



Stephane Asselin is chief executive for Asia at Aurecon.

Credit: Ontario Power Generation



Top100
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Third Agreement Signed for Yukon Resource Gateway Project

2020 Top100 Projects Rank: 91
Value: \$468 million

The Government of Yukon and the Ross River Dena Council (RRDC) have reached an agreement in principle for the North Canol Road and Campbell Highway components of the Yukon Resource Gateway Project.

“This agreement in principle with the Ross River Dena Council will provide valuable capacity and economic opportunities to the community and is a tremendous step forward for reconciliation. We look forward to finalizing this agreement and working together with the community to improve this critical infrastructure to enable mineral industry development,” said Yukon’s Minister of Energy, Mines and Resources Ranj Pillai.

Ross River Dena Council is collaborating with the Government of Yukon on the development, environmental and regulatory aspects of the two road component upgrades. The work will include bridge replacement

and safety improvements on North Canol Road and construction and resurfacing of kilometre 354.9 to kilometre 414.4 of the Robert Campbell Highway.

“Our community has been in need of improvements to the North Canol and paving for the Campbell Highway for many years,” said Chief of Ross River Dena Council Jack Caesar. “We have some of Yukon’s largest prospective mineral and remediation projects, but we had been the only community in Yukon without a paved highway. This important project will finally see our members have a safe road to drive to and from work, a road that helps ensure we are connected to opportunity.”

The Government of Yukon and the Ross River Dena Council will collaboratively develop and implement a strategy to enable RRDC and other Kaska members to qualify for and maintain employment, enable

designated businesses to secure contracting opportunities, and improve economic and human wellbeing for Ross River Dena Council and other Kaska members.

This is the third agreement to be reached as part of the Yukon Resource Gateway Project. The second agreement, reached in January 2020, was with the Liard First Nation to make improvements to the Nahanni Range Road.

The Government of Yukon and Little Salmon/Carmacks First Nation reached an agreement for the proposed Carmacks Bypass component of the Yukon Resource Gateway Project in March 2019.

Ross River Dena Council owns Tu Lidlini Petroleum, Dena Cho Environmental and other businesses, which are positioned to benefit from these construction projects.

The project has an estimated capital cost value of approximately \$71 million. ✪



OPG Completes Unit 2 Reactor Construction

2020 Top100 Projects Rank: 3
Value: \$12.8 billion

Ontario Power Generation (OPG), along with its project partners and vendors, have now completed construction on Darlington Nuclear Generating Station’s Unit 2 reactor. The unit will now begin the restart process before being connected to the electricity grid, subject to regulatory approvals from the Canadian Nuclear Safety Commission and OPG’s ability to do so safely given the current COVID-19 crisis.

This marks a significant milestone on the Darlington Refurbishment Project, one of Canada’s largest clean energy projects, which will extend the life of the station for an additional 30 years.

“On behalf of all OPG employees, project

partners and vendors, I want to thank our refurbishment team on completing the final steps of construction on Unit 2 under unprecedented and extraordinary circumstances,” said Ken Hartwick, OPG’s President and CEO. “The project team continued to work safely and diligently while managing changes required as a result of the COVID-19 pandemic.”

OPG is also taking steps to ensure a stable supply of clean electricity during the COVID-19 crisis to keep the lights on for hospitals, families, and essential businesses. This includes protecting the well-being of workers and supporting public safety through physical

distancing at work sites and prioritizing work to limit the number of people at OPG stations.

As part of these measures, OPG will continue operating the Darlington Nuclear Generating Station’s Unit 3 reactor, temporarily delaying the planned start of its refurbishment, which was scheduled to begin in May. In the coming weeks, the Darlington Unit 3 project team will determine the best time to restart the project, ensuring the required critical resources and materials are available. Critical initiatives, such as completion of Darlington’s Unit 2 refurbishment and preparations for the spring freshet, continue as planned. ✪

APPOINTED



Joe McBrearty

Canadian Nuclear Laboratories (CNL) has announced the appointment of **Joe McBrearty** as its new president and chief executive officer. McBrearty served as CNL's chief operating officer for the past year and will replace **Mark Lesinski**, who has successfully completed his term as president and CEO and will be continuing his career elsewhere in the nuclear industry.

As president and CEO at CNL, McBrearty will continue to enact improvements to the company's research program, safety performance, security posture, capital program, and waste management activities. While he is currently focused on CNL's response to the COVID-19 pandemic, his mandate will include the delivery of major environmental remediation projects, the operation of Canada's national nuclear research program, and the \$1.2 billion revitalization program to modernize CNL's Chalk River campus.

Prior to joining CNL, Joe served as COO and deputy director for field operations with the Office of Science at the U.S. Department of Energy (DOE), where he oversaw the operations of 10 U.S. national laboratories and over 25,000 contract and federal staff. In this role, McBrearty realized major improvements in nuclear operations, led strategic planning and oversight of laboratory operations, and spearheaded infrastructure and management policy changes in support of the U.S. DOE's research and development program.



Linda Coady

The board of directors of the Pembina Institute has announced that **Linda Coady** will assume the role of executive director. Coady brings extensive experience finding common ground to

Pembina's work advancing climate action across all sectors of Canada's economy.

Prior to joining the Pembina Institute, Coady served as the chief sustainability officer at Enbridge Inc. She has also

served as the chair of the advisory committee to the Government of Canada on Indigenous Economic Participation in the Trans Mountain Pipeline, co-chair of the Government of Canada's Generation Energy Council, and has been a member of the advisory panel on climate leadership for the province of Alberta.

Coady has assumed the executive director role at Pembina Institute based in Vancouver, replacing interim director **Simon Dyer**, who has resumed the role of deputy executive director.



Dale Nally

Dale Nally has been sworn in as Alberta's Associate Minister of Natural Gas and Electricity.

The associate minister will now be responsible for overseeing Alberta's electricity sector—in addition to natural gas and petrochemicals.

The effective operation of Alberta's natural gas and electricity systems is critical for our province's health-care response to the COVID-19 pandemic, and for supporting much-needed economic activity across the province.

The Associate Minister of Natural Gas and Electricity will continue to operate within the Ministry of Energy to support Albertans and protect jobs by strengthening the long-term stability of Alberta's natural gas and electricity systems.

The Federation of Northern Ontario Municipalities (FONOM) has announced the appointment of North Bay councillor **Mac Bain** as its new executive director.

"Mac's knowledge of the issues facing our region will be an asset to our membership. He will fulfill the duties of the Executive Director on a part time basis under the direction of the Executive," said FONOM President **Danny Whalen**.

The board thanks **David King** for the time and energy he gave the organization over his tenure.



Monique Smith

Monique Smith has joined Global Public Affairs as a senior associate based in Toronto with a focus on Canada-U.S. relations.

A strong advocate for Ontario's interests, Smith was the first person to hold the Washington post in the Canadian Embassy, a post she held for five years. While in Washington, Smith had a unique view of Ontario's position in North America particularly in how the province tackled infrastructure development which challenged both state and federal governments in the U.S. In partnership with a variety of Canadian stakeholders including Infrastructure Ontario, Smith provided the Ontario perspective in a variety of fora including through the expert panel on public/private partnerships at the National Governors Association, to various U.S. federal departments and organizations and to international organizations such as the World Bank and the Inter-America Development Bank.



Laurie Pushor

The Alberta Energy Regulator (AER) has announced **Laurie Pushor** has been named president and CEO.

Pushor has an in-depth understanding of—and appreciation for—the critical work of the energy regulator. As deputy minister of the Saskatchewan Ministry of Energy and Resources, he played an integral role in ensuring regulation was well-managed and balanced in protecting the environment while allowing responsible energy development.

Mr. Pushor also has experience leading organizations through major transformation and change, which will be an asset as the AER continues its journey to ensuring we have not only the structure, but the vision and culture needed to achieve its mandate.

The AER's board of directors thanked **Gordon Lambert** for his service to the AER, and for helping ensure a smooth transition. ♣

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ON THE FRONT LINES

Public works heroes sustain our quality of life during times of crisis.

By Todd Latham

Like millions of people across Canada, I worked from home and practiced physical distancing for the last few weeks of March and all of April. I added many likes and loves to the plethora of social media posts on the courage and tireless efforts of global medical and nursing staff, paramedics and safety equipment manufacturers. They are all superheroes.

You know who else deserves a gazillion thanks, thumbs, and hearts? The men and women who keep our water clean and pumping into our homes, the municipal worker who continues to pick up our garbage and recycling, and the site supervisor who ensures his people are safe while our critical infrastructure is built and maintained. As we pulled together this issue of ReNew Canada from our respective homes, I began to gather stories about these unsung heroes—and discovered many voices who shared my respect and admiration the public works teams on the front lines. Not just those in

the hospitals, but under our streets, in the power plant, and on the construction sites.

I spoke with an asset manager who shared a discussion she had with the city director of operations who instead of taking a pause, was going to try and accelerate road and transit work to take advantage of less traffic congestion and access issues. There was the candid chat I had with an environmental contractor who was continuing the cleanup of a contaminated site to ensure the project stayed on track, despite mixed signals on what to do from their government client. And there was the long and complex discussion I had with a labour leader who was working hard to ensure onsite safety without slowing down a hospital project moving forward in time of expanded need.

Over the last month or so, I have received hundreds of emails from organizations in our industry announcing how they were adjusting to the COVID-19 crisis in order to provide the products and services our cities

and towns required to stay operational. The messages were universally supportive, resilient, and hopeful—offering resources, remote access, and other extraordinary measures to ensure the machinery of society kept moving while the pandemic shut down much of the planet. Canadian municipal public works, construction teams, consultants and engineers are essential services and have all remained on the front line to help us stay clean and safe in our homes—and in the process have gained similar 'hero' recognition as the doctors and nurses who are fighting the medical battle. Let's keep it that way. ♣



Todd is the founder of ReNew Canada and would like to thank our many clients and readers who have stayed the course and continue to support our now 15 year old media company during this unprecedented time.



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