May/June 2021

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The Infrastructure Magazine

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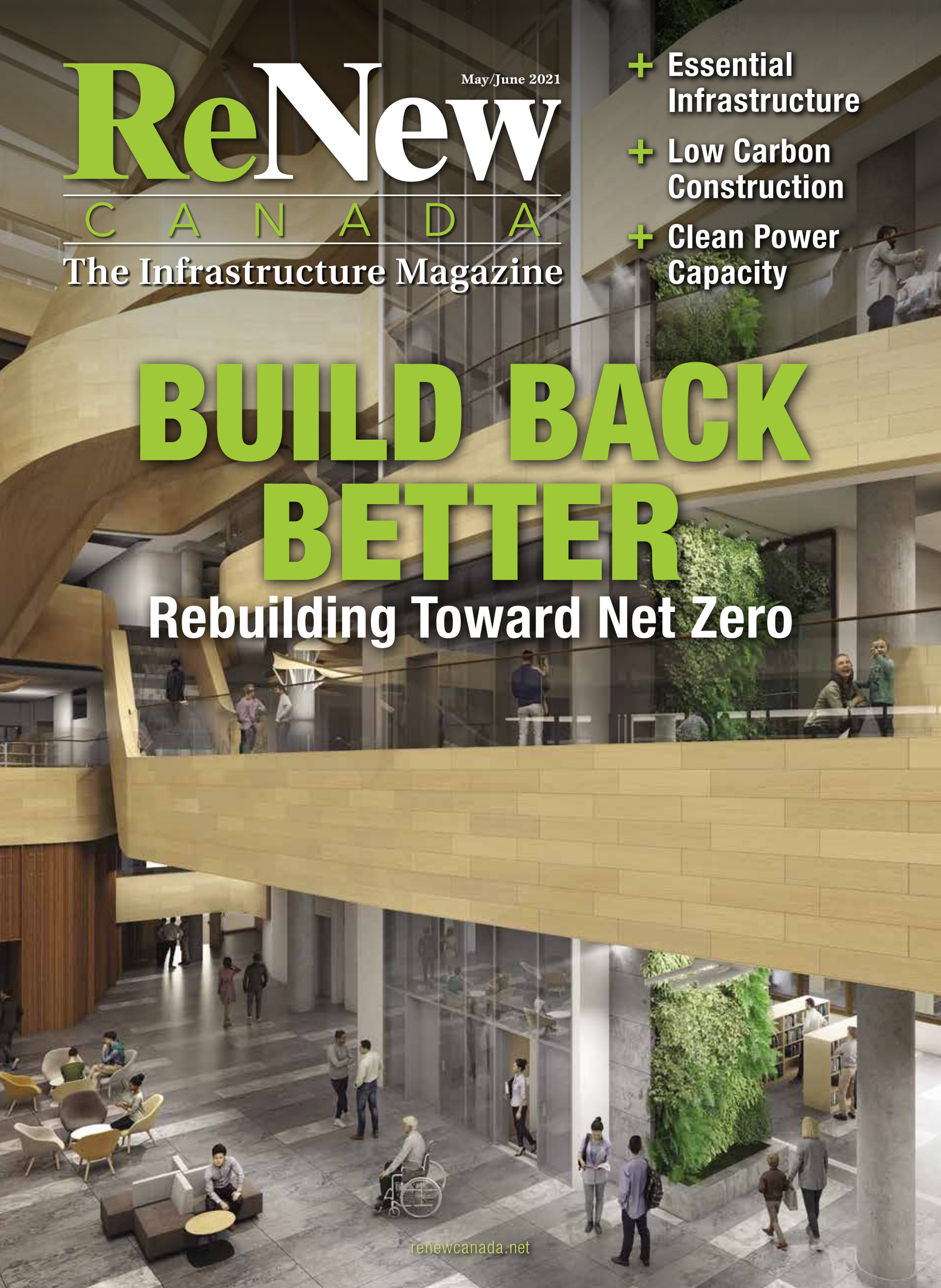

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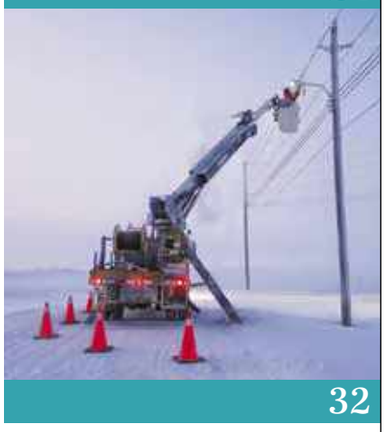

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ReNew CANADA
The Infrastructure Magazine

MAY/JUNE 2021

BUILDING A WAY OUT

By Corinne Lynds

It hardly seems possible now, but more than a year ago COVID-19 struck, and we were all at home for two weeks, baking bread, mastering 1,000-piece puzzles, and binge-watching Netflix. Weeks turned into months, and it became painfully clear this pandemic wasn't something that could simply be waited out.

So, we got on with business, from our home offices, bedrooms, and kitchen tables, and found ways to keep Canada's most important infrastructure projects safely moving forward. We became experts at Zoom calls, physically distanced meetings, and orchestrating elaborate job-site schedules to accommodate reduced workforces.

Arguably, there has never been a time in history when the proverb "Necessity is the mother of invention," has rung more true.

After months of delays driven by supply chain and workforce issues, the industry came together with a variety of measures to bring projects to completion. A great example of this is the Accelerated Build Pilot Program that the Humber River Hospital, Government of Ontario, and Infrastructure Ontario partnered on. Employing a range of accelerated measures such as modular construction, rapid procurement, and extended construction hours, the project is expanding long-term care capacity in North York by 320 beds in months, not years.

And this magic formula of accelerated procurement plus modular construction is gaining popularity. Beyond the Humber River project there are plans for two further long-term care facilities in Ontario (640 beds in Ajax and a further 320 beds in Mississauga). Bird Construction was awarded two accelerated projects in Northern Ontario for correctional facilities in early March. And Toronto's first modular supportive housing project opened its doors in December.

Prefabricated building technology certainly isn't a new concept, but given the challenges of physical distancing on jobsites, it has proven an excellent option. It allows manufactured components such as walls, panels, or even full units to be built off-site in a factory and then assembled onsite Lego-style. This not only reduces the number of workers onsite, but also accelerates construction by as much as 50 per cent, according to a 2019 report from consulting firm McKinsey & Company.

While modular construction allows the physical building to come together quickly in a controlled setting, accelerated procurement drives innovation and gets shovels in the ground faster.

With accelerated procurement, governments dispense with the need for reference design, and instead decide what they want as an output. Then industry figures out how to meet the functional requirements and build the project. Design teams start with a blank canvas and are given the space to come up with innovative solutions. The real speed in this process comes from the fact that the major tasks of procurement and planning approval run in parallel.

We need to keep these creative juices flowing if we're going to build our way out of this pandemic. But creative juices alone are not going to be enough. All levels of government need to deliver on promised infrastructure investments in order to help rebuild the Canadian economy.

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ABOUT THE COVER

The Ottawa Public Library and Library and Archives Canada renewal project will make significant enhancements to the joint facility to achieve net-zero carbon performance.
For more on low carbon buildings, see page 20.
For more on green infrastructure, see page 24.

NEW NET ZERO PUBLIC LIBRARY INFRASTRUCTURE

Credit: Library and Archives Canada

The new Ottawa Public Library-Library and Archives Facility will feature an innovative and energy efficient design.

The project to rebuild the Ottawa Public Library (OPL)–Library and Archives Canada (LAC) Facility includes an innovative design that complies with the LEED Gold standard, an independent certification that takes into account ecological land and water use, energy efficiency, and sustainable materials.

Additional federal funding of $34.5 million will now also allow for: building envelope and insulation upgrades; triple-glazed windows; rooftop and façade solar panels; an indoor "green wall;" and, more sustainable materials.

"As we know, tackling climate change requires a concerted effort and collaboration across all sectors and levels of government. Our Ottawa Public Library – Library and Archives Canada Joint facility will be an iconic part of our city and thanks to this Federal funding we are able to enhance the design to be a net-zero carbon facility," said Ottawa Mayor Jim Watson. "This supports Council's ambitious targets to reduce our city's greenhouse gas emissions by 100 % by 2050 and is a great example of collaboration that helps us proactively manage climate impacts."

The five-storey OPL-LAC will measure 216,000-square-feet (20,067 square-metres) and will include reading rooms, an archive and research centre, a children's area, exhibition and collections spaces, a genealogy centre, and a cafe. Construction is scheduled to be completed in 2024 and officially open to the public in 2025.

"During the public engagement process, we heard loud and clear that sustainability is key and the joint facility should set the bar for other public libraries and institutions," said Matthew Luloff, city councillor and chair of OPL's board. "This is something all of us can be very proud of."

NEXT ISSUE: JULY/AUGUST DIGITAL REVOLUTION

Future Forward	Cyber Attacks	Transportation Infrastructure
The Digital Age of Construction	How to Protect Municipal Assets	Update on Transit Projects

CANADA'S FIRST NATIONAL INFRASTRUCTURE ASSESSMENT

The spire of the Parliamentary Library is in the foreground and the Interprovincial and McDonald-Cartier bridges are in the background, joining Ontario and Quebec across the Ottawa River in downtown Ottawa and Gatineau.

Catherine McKenna, Minister of Infrastructure and Communities, has launched an engagement initiative for Canada's first national infrastructure assessment: Building the Canada We Want in 2050.

"The COVID-19 pandemic has caused the greatest recession since the Great Depression and we have a once-in-a-generation opportunity to build the Canada we want as we invest in our recovery," said McKenna. "But we will not achieve our ambition by accident. Working with Canadians, using the best available data and guided by global best practices, we can guide our infrastructure spending to chart a strong path to 2050, creating good jobs, tackling climate change, and building cleaner, more inclusive communities. Working together, this project can be nation-building."

The paper sets out the purpose and benefits of undertaking a National Infrastructure Assessment and seeks input from the public, Indigenous Peoples, provinces, territories, municipalities, and stakeholders on three main priorities of the assessment:

- Assessing Canada's infrastructure needs and establishing a long-term vision;
- Improving coordination among infrastructure owners and funders; and
- Determining the best ways to fund and finance infrastructure.

Following the engagement process, the federal government will consider the next steps, including reviewing priorities, establishing an independent advisory body, setting out the processes for obtaining expert advice, ongoing public engagement, and producing interim studies and reports to inform infrastructure policy and investment.

Once in place, the National Infrastructure Assessment, will help identify Canada's evolving needs and priorities in the built environment and undertake evidence-based long-term planning toward a net-zero emissions future.

The deadline for providing feedback is June 30, 2021.

Canadian Urban Transit Association

CLEAN PUBLIC TRANSIT RECEIVES A BOOST

The Government of Canada is investing $2.75 billion in funding over five years, starting in 2021, to enhance public transit systems and switch them to cleaner electrical power, including supporting the purchase of zero-emission public transit and school buses.

This funding is part of an eight-year, $14.9 billion public transit plan that will support municipalities, transit authorities, and school boards with transition planning for the electrification of transit systems, including the delivery of 5,000 zero-emission buses over the next five years.

"As part of its $10 billion Growth Plan, the Canada Infrastructure Bank (CIB) is committed to investing $1.5 billion in zero-emission buses," said Ehren Cory, CEO of CIB. "We will help create jobs, reduce greenhouse gases, and make commutes cleaner."

This investment will create more well-paying jobs in Canada's robust and growing electric vehicle manufacturing sector and infrastructure system. Nova Bus in Saint-Eustache, Lion Electrique in Saint-Jérôme, GreenPower in Vancouver, and New Flyer in Winnipeg are examples of innovative companies that are already delivering zero-emission transit solutions.

Infrastructure Canada will ensure coordination between this investment and the CIB commitment to invest $1.5 billion in zero-emission buses and associated infrastructure as part of its three-year Growth Plan.

"Zero-emission buses (ZEBs) will benefit Canadians by creating manufacturing and energy jobs in the low-carbon economy, while also transporting Canadians in a way that is safe, green, healthy and sustainable," said Josipa Petrunic, president and CEO of Canadian Urban Transit Research & Innovation Consortium. "Transit agencies and municipalities in Canada are ready for electrification, and these funds will empower them to move forward towards the goal of 5,000 ZEBs."

Carpenter's District Council of Ontario

CONSTRUCTION INDUSTRY ADVOCACY FOR MORE INCLUSIVE INFRASTRUCTURE

A growing coalition of government and construction industry representatives is making a public commitment to promote inclusive, equitable, safe, and respectful workplaces.

Developers, contractors, unions, associations, and workers involved in the construction of large and critical infrastructure projects are uniting to support the Toronto Declaration of Inclusive Workplaces & Communities. The declaration affirms the health and safety of every person and supports the construction industry's zero tolerance policy for discrimination or acts of hate of any kind.

Many employers in the construction industry have not just signed on to this declaration but are taking further action to educate their members about the importance of eliminating racism and discrimination in the industry. For example, EllisDon has hosted diversity and inclusion town halls to discuss these crucial issues with employees, and Daniels Corporation has organized site meetings with construction teams to impress the importance of inclusive workplaces and to reiterate zero tolerance for discrimination on job sites.

"EllisDon has zero tolerance for racism, and as an employer, we have a pivotal role to play in this movement. We will continue to work closely with our union partners to promote education and action across all areas of our industry," said Geoff Smith, president and chief executive officer of EllisDon.

The Carpenters' District Council of Ontario (CDCO) is also proud to be a part of this industry coalition. The council is calling on the collective responsibility of the industry to demonstrate that construction is a welcoming path for the next generation of tradespeople—regardless of their background.

"We're working with a third-party company to deliver anti-racism training for staff, shop stewards, and eventually all of our members," said Chris Campbell, equity and diversity representative for the CDCO. "Our partners across the labour movement have also begun rolling out this training to their members and we encourage everyone to join us and do the same."

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The Trans-Canada Highway is a vital link in British Columbia. Widening the highway to four lanes will provide better safety and capacity.

Inset: Rob Fleming

BUILDING BACK BETTER IN B.C.

Forging a brighter future with Minister of Transportation and Infrastructure Rob Fleming.

By Connie Vitello

In his mandate letter, British Columbia Premier John Horgan outlines a challenging variety of duties for Rob Fleming, British Columbia's new Minister of Transportation and Infrastructure. Over the course of his mandate, he's expected to deliver on a tall order of infrastructure tasks.

Build a range of important infrastructure projects. Ensure that infrastructure investments deliver benefits for local communities and workers through the use of Community Benefit Agreements. Develop a strategy to streamline consultation, tendering, and construction of infrastructure projects without unnecessary delays. Work with BC Transit to help families get around more affordably. Improve transit options for rural communities. Make BC Ferries more responsive and accountable. Expand networks of active transportation to meet the CleanBC goal of doubling trips taken by walking, biking, and other kinds of activity. Help lead work on the Integrated Transportation and Development Strategy to ensure greater alignment between transportation and land-use planning. And that's not all.

On any given year, this list would be challenging but during the ongoing pandemic the difficulty dial is turned up. ReNew Canada recently engaged Minister Fleming to reflect on his relatively new role and bring us up to speed on his progress so far.

How is your previous experience in education, finance, and public transit helping you to perform in your new role?

I am delighted to be in my new role as Minister of Transportation and Infrastructure. I have been extremely impressed by the level of dedication that our ministry staff have—from their great work on highway improvements to major infrastructure projects and active transportation projects. I also have the privilege of working with our partners like BC Ferries and BC Transit. The level of commitment, expertise, and energy the ministry staff give to their jobs is incredible.

My previous cabinet position has helped me to prepare for this new challenge because the overarching priority of our government is to help everyday people, especially in the urgent context of COVID-19 recovery. This was true at the Ministry of Education and it's also true at the Ministry of Transportation and Infrastructure.

Our government has made a commitment to make life more affordable for British Columbians, to deliver the services that people count on and to build a strong and innovative economy that works for everyone. We remain committed to these goals and are putting people at the forefront of all the decisions we make.

What are some of the key goals that you have for B.C.'s transportation and infrastructure ministry?

Right now, our government is focussed on COVID-19 recovery and rebuilding. From the outset of the pandemic, our government put COVID-19 safety protocols in place on road and highway job sites across the province to help prevent the spread of COVID-19. Because of that commitment we were able to continue work on our

highways, keep people employed, and keep the economy moving.

Investment in our transportation infrastructure has never been more important as we recover economically from the pandemic. This has meant good progress on important projects like work to widen Highway 1 to four lanes east of Kamloops, the new replacement for the Pattullo Bridge, Highway 1/Lower Lynn Improvements on the North Shore, the Highway 4/Kennedy Hill Safety Improvement Project east of Tofino, and many more across B.C.

Looking ahead, keeping our economy moving is an integral part of BC's Restart Plan. We've been busy supporting recovery efforts from the effects of the pandemic. We continue to work closely with the federal government to make investments that are focused on economic, social, and environmental sustainability. It's important that as we look to the future beyond this pandemic that B.C.'s transportation networks are even more robust and resilient.

> We are making priority investments in large projects that will help us rebuild, create good-paying local jobs, and at the same time make our transportation networks even stronger and more robust.

Are there specific steps your team is taking to deduce how to address certain current challenges facing transportation and infrastructure development and maintenance?

COVID-19 has certainly been a huge challenge in so many ways. But everyone in the transportation construction industry has worked together to put proper workplace policies and procedures in place, like physical distancing on the job site and reducing the number of in-person meetings, so the industry could keep projects moving.

We recognize that work on improving our transportation corridors—everything from building new infrastructure, to repairing roads and bridges, to fixing potholes—is critically important to allow for the safe and efficient movement of people and goods. We need to keep our supply chains open and keep our routes as safe and as efficient as possible. To that end, we are working to stay on track with our current infrastructure project and accelerate others.

The population of Metro Vancouver is growing at a rapid rate and needs several major infrastructure investments. That's why we are so excited to see site preparation works getting underway for the Broadway Subway Project—which will transform how people get around.

This project is an example of the Government of B.C., the Government of Canada and the City of Vancouver, coming together to deliver a fast and frequent SkyTrain service to B.C.'s second-largest jobs centre. When completed, the Broadway Subway will provide quicker access to health-care services, an emerging innovation and research hub, and growing residential communities.

Credit: TransLink

The Broadway Subway Extension will see the addition of six underground stations and 5.7 kilometres of track to the Millennium Line.

The Community Benefits Agreement provides quotas for apprentices, preferential hiring of women and Indigenous workers, and a stipulation for workers to be unionized. Has there been a significant impact to infrastructure projects?

In B.C., we have some large infrastructure projects that are using a Community Benefits Agreement (CBA). These projects include the Broadway Subway Project, the Pattullo Bridge Replacement Project, and the Highway 1 4-laning Program (Kamloops to Alberta). B.C. is experiencing a skilled trade shortage and we know that we need to cultivate a diverse workforce to meet the demand in our growing economy. The CBA is designed to maximize opportunities to mobilize and grow a safe, diverse, and skilled workforce in the province.

The CBA will provide priority hiring for local people, Indigenous peoples, women, and other traditionally underrepresented groups in the trades. Greater apprenticeship and skills training opportunities are available by setting target ratios for each CBA project independently. It also provides safe working conditions free of discrimination, harassment, and ensures a culturally competent workforce. While this means an investment upfront, the long-term economic benefits of training the next generation of skilled workers and expanding the construction workforce far outweigh the costs.

There has been pressure to alleviate the gridlock in the Greater Vancouver Area. Please provide us with an update on emerging projects such as the transportation study for Fraser Valley.

The population of Metro Vancouver is growing at a rapid rate and needs several major infrastructure investments.

We are looking into a range of possibilities to support smart growth in the Fraser Valley to help ensure the development of affordable and liveable communities. Our current study will look at traffic congestion and travel demands in this fast-growing region and evaluate options for new transit and transportation initiatives. The report will examine plans for more investments in major highway projects like widening Highway 1 through the Fraser Valley to Abbotsford. It also includes looking at other options, such as commuter rail, a Surrey SkyTrain extension to Langley Town Centre and high-speed connections with our neighbours to the south.

I know that people who commute every day in Metro Vancouver want a solution for the George Massey Tunnel gridlock. Building the right project is the priority and we have worked closely with Indigenous groups and regional mayors through the planning stages. Progress is being made towards selecting a new crossing on Highway 99 that aligns with the needs of the region and the people that rely on this transportation route. Our next steps are to review the submission, consult with our partners and make a final decision on the two shortlisted options that have been presented to the public.

What are your thoughts on how to optimally recover from the COVID-19 crisis in terms of resilient infrastructure and environmental investments for upcoming projects?

People around the province are benefiting from more reliable roadways and local jobs as a result of funding from StrongerBC: BC's Economic Recovery Plan. We are making priority investments in large projects that will help us rebuild, create good-paying local jobs, and at the same time make our transportation networks even stronger and more robust. Our Clean BC program will incent and accelerate the electrification of cars, heavy duty vehicles, and ferries.

While we look to dramatically improve congestion, road traffic, and safety, we also know we need to focus on sustainability. Our Climate Adaptation Program, which features 60 projects across B.C. will increase the resiliency of the highway network and help lessen the adverse effects of climate change. This means upgrading our systems of defense to guard against extreme flooding, erosion, and other climate change events.

From the lower mainland and the island, to the interior and northern B.C., we will continue to move transportation projects forward that will support communities and climate goals as we recover from COVID-19 and look forward to a brighter future.

Connie Vitello is interim editor of ReNew Canada.

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BENEFICIAL BUILDING TREND

Credit: Gordie Howe International Bridge

The Gordie Howe International Bridge project is providing targeted community benefits on both sides of the border. In Windsor, the Workforce Development and Participation Strategy is supporting workforce, training, and pre-apprenticeship and apprenticeship opportunities.

The evolution of CBAs in Canadian infrastructure development.

By Tim Runge

A Community Benefits Agreement (CBA) is a legal contract that specifies community benefits for an infrastructure or development project. CBAs come in three basic formats: private CBAs are signed between developers and community groups; public CBAs are requirements in government Requests for Proposals; and, hybrid CBAs are multi-party agreements with developers, governments, and community groups.

In Canada, several CBA models have been tried. Canadian CBAs have emphasized labour development; most have employed low-income or disadvantaged populations and created apprenticeships opportunities.

The Vancouver 2010 Olympic and Paralympic Winter Village used a hybrid CBA. In 2005, a new non-profit, Building Inner City Businesses (BOB) was the primary negotiator on a CBA signed with the City of Vancouver and the developer to provide jobs for inner-city residents and procurement targeted to local businesses.

Toronto Community Housing Corp. partnered with Daniels Corp. to transform low-income social housing in Regent Park into a mixed-use community, combining affordable housing with market-price condominiums, commercial and retail spaces, and community amenities. Construction jobs and training were part of the project.

In 2018, the Government of Canada began encouraging Community Employment Benefits (CEB) in projects funded through the Investing in Canada program. This framework created targets for employment, training, and procurement opportunities for apprentices, Indigenous peoples, women, persons with disabilities, veterans, youth, recent immigrants, small businesses, and social enterprises.

Federal-provincial infrastructure funding requires community benefits.

British Columbia

B.C.'s CBA requires employers to hire locally, provide apprenticeship training, and give Indigenous people and women opportunities. Any contractor in the construction industry can bid on and perform project work. The agreement includes:

- Hire workers within a 100-kilometre radius of the site.
- Indigenous people, women in trades, and other disadvantaged groups have priority in all hiring and training on government-funded projects.
- Target apprenticeship ratio of 25 per cent, variable on a trade-by-trade basis.
- Every worker paid union wages.
- Wages and benefits increased by two per cent each year to 2024.
- No-strike, no-lockout clause.

The government created BC Infrastructure Benefits Inc. (BCIB), a Crown corporation to handle hiring and paying all workers under the CBA. BCIB also handles union dues deductions. Open-shop companies' employees are required to join a designated union, the new Allied Infrastructure and Related Construction

Credit: PCL

An inclusive construction site at the Sturgeon Refinery in Alberta. It is the first refinery built in Canada in over 35 years, and the only refinery designed from the outset with a carbon capture solution to maximize performance and minimize environmental impacts.

Council of BC, after 30 days on the job.

B.C.'s CBA is not a standard CBA since it applies to many projects across an entire province. Its labour requirements make it closer to a Project Labour Agreement (PLA), an agreement to use only union labour on site.

A coalition of construction associations opposed to the province's CBA (specifically a requirement that workers must join trade boards) filed suit in BC's Supreme Court.

Manitoba

In 2010, Manitoba's East Side Road Authority (ESRA) launched CBAs aligned with the Aboriginal Procurement Initiative to increase Indigenous involvement in Manitoba's procurements. The CBAs provide contracts and training to community-owned construction companies for pre-construction work and establish hiring requirements in construction tenders: 30 per cent of total in-scope contract hours to be worked by residents for road construction, and 20 per cent for bridge construction. ESRA invested more than $80 million into First Nation communities and created about 600 job opportunities.

Ontario

The *Infrastructure for Jobs and Prosperity Act* of 2015 (IJPA) and the *Long-Term Infrastructure Plan of 2017* (LTIP) committed to community benefits in all major public infrastructure projects.

IJPA's purpose was to encourage evidence-based, strategic, and long-term infrastructure planning to support job creation, training opportunities, and economic growth. During the procurement process, a plan must be developed outlining the number of apprentices that will be involved, particularly women, newcomers, at-risk youth, veterans, and Indigenous populations.

LTIP committed to develop a policy framework for community benefits, focusing on workforce development opportunities for traditionally disadvantaged communities, underrepresented workers, and local residents. This set out a process for community benefits pilot projects to test different approaches, the development of a CBF in partnership with stakeholders and partners, and application of the framework to all major public infrastructure projects.

The current provincial government continued existing CBAs as pilot projects on a voluntary market participation basis.

> Canadian CBAs have employed disadvantaged populations and created apprenticeships opportunities.

Municipal initiatives

A growing number of Canadian municipalities are investigating or implementing social procurement, including CBAs, CEBs, and Community Benefits Frameworks (CBFs). The list includes: in B.C., Cumberland, Vancouver, Victoria, and Surrey; in Alberta, Calgary, Edmonton, and Wood Buffalo; in Ontario, Hamilton, Toronto, and Windsor; and, in Quebec, Montreal.

In 2018, Vancouver was the first Canadian municipality to adopt a CBA policy. Developer applications for rezoning that exceed 500,000 sf are subject to 10 per cent local employment and 10 per cent local procurement requirements.

The City of Toronto had experience with CBAs before instituting a social procurement policy in 2016 to leverage the city's purchasing power by achieving socio-economic impacts for Indigenous peoples and equity-seeking residents. The city's CBF was adopted in 2019 and is now in development and testing.

Metrolinx, Ontario's regional transit agency, negotiated a CBF with the Toronto Community Benefits Network for the Eglinton Crosstown LRT project. It outlines the roles and responsibilities of four partners implementing targeted workforce and economic development goals, including the Ministry of Advanced Education and Skills Development and Crosslinx Transit Solutions, the builder.

The province finalized this agreement, setting a goal of 10 per cent of all trade and craft working hours performed by apprentices and journeypersons who are historically disadvantaged in the job market.

Through this CBF, by Q1 2020 nearly 400 people had been hired from local communities in construction and professional, administrative, and technical jobs, and more than $7.5 million was purchased from local small and medium-sized businesses.

P3 projects with CBAs

Most CBAs in Canada are for smaller, municipal-level projects, while public-private partnerships are typically used for larger projects, so there are few P3 projects with CBAs. In late 2019, P3s with CBAs were in Ontario and British Columbia:

- Finch West Light-Rail Transit (LRT)
- Eglinton Crosstown LRT
- Hurontario LRT
- Macdonald Block Reconstruction
- West Park Healthcare Centre Development
- Gordie Howe International Bridge
- Thunder Bay Correctional Complex
- Pattullo Bridge
- Millennium Line Broadway Extension (SkyTrain)

For some P3 projects in Ontario, achieving LEED® silver certification is part of the CBA.

HIGHLIGHTS OF SELECT P3 PROJECTS AND THEIR CBA REQUIREMENTS

P3 Project	CBA Benefits
Eglinton Crosstown LRT	• Recruit for Crosslinx employment opportunities. • Provide training and workforce development opportunities to youth and others facing employment barriers. • Procure goods and services from local businesses and social enterprises whenever possible. • Build a green energy facility.
Hurontario LRT	• Ensure Peel residents access employment opportunities. • Opportunities for social enterprises to benefit from project procurement. • Focus on youth for apprenticeship, newcomers, and foreign-trained professionals. • Opportunities for residents to enter careers in construction trades or their area of expertise.
Gordie Howe International Bridge	• At least 20 per cent of new hires from the local area for construction and permanent jobs. • Targeted community benefits on both sides of the border. • Focus on supporting workforce, training, and pre-apprenticeship and apprenticeship opportunities, including for Indigenous peoples, women, and youth.

What do major P3 players think?

We interviewed senior executives from the private sector who are involved in P3 projects with CBA requirements.

While the spectrum of opinion about CBAs ranged from strong opposition to strong support, all stressed the need for standard definitions of "community" and "benefits" and of who receives the benefits, and how. Industry needs to know about a CBA early, preferably before the Request for Qualifications (RFQ) stage and certainly before financial close.

There was a strong call for factual assessment and realistic development of a project's local labour force, on both supply and demand sides. How many new workers can be hired, at what levels, and for how long, was not sufficiently understood by governments or community advocates.

Also, community advocates did not always understand CBAs are project specific, and the benefits in one project's CBA are not always applicable to other projects.

P3 practitioners cautioned that, although P3s are big projects, there is not necessarily more time to advance training or apprenticeship for new hires. Who is required, when, and for how long can be unknown in the early days of the project, and some trades might be required for only short periods, even on multi-year projects.

When asked for examples of successful CBAs, two projects were prominent: Vancouver 2010 Olympic and Paralympic Village, and Eglinton LRT.

Note: This article is based on a recent report written in collaboration with The Canadian Council for Public-Private Partnerships: P3s and Community Benefits Agreements in Canada (January 2021.)

Tim Runge is a partner with Constructive Edge, a corporate advisory and support firm with offices in Australia, Belgium, Canada, UK, USA, and India.

PREFAB PRECAST CONCRETE BUILDS ON...
ACCELERATED BRIDGE CONSTRUCTION (ABC)

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Photos: BPDL, Alma, QC

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MUNICIPAL PROJECT BUNDLING

An effective way to accelerate infrastructure delivery?

By Andy Manahan

Due to the COVID-19 pandemic, municipal finances are tight and even with funding support from senior orders of government, it will be difficult for local governments to address asset management priorities. The property tax base has always had its limits and is now being stretched by operational demands. Gas tax and other programs have played an important role in funding community infrastructure, but these are insufficient to meet the growing backlog of projects.

Are there alternate ways to promote state-of-good-repair or even replacement of aging structures in an expedited fashion and to achieve the multiple policy goals? Canada's infrastructure and communities minister, Catherine McKenna, has advocated for a "triple duty" approach where economic recovery imperatives are bolstered by greater resiliency and social inclusion considerations, including community benefits.

Project bundling provides an opportunity to fast-track construction delivery timelines and to do so at reduced costs. In the U.S., major bridge bundling programs have resulted in hundreds of aging or structurally deficient bridges being rehabilitated or replaced within a short period of time compared to traditional procurement methods.

In 2017 I was the kickoff speaker at an infrastructure forum hosted by S&P Global Ratings and the Canadian Council of Public-Private Partnerships (CCPPP) to discuss how the market potential of bundling could be unlocked and to explore solutions to fund smaller assets. Two major bridge bundles were discussed: Missouri's Safe and Sound Program where 802 bridges in poor condition were replaced (554) or rehabilitated (248) by late 2012, well ahead of schedule, and the in-progress Pennsylvania Rapid Bridge Replacement Project to address 558 structurally deficient bridges. This article expands on this presentation by examining recent experiences such as the move to bundle other asset classes.

What does "bundling" mean?

A straightforward explanation of project bundling is "awarding a single contract for several preservation, rehabilitation, or replacement projects." According to a 2011 paper prepared by Infrastructure Ontario, bundling refers to "the grouping or consolidation of the procurement of two or more projects with the view of entering into a single contract with one vendor."

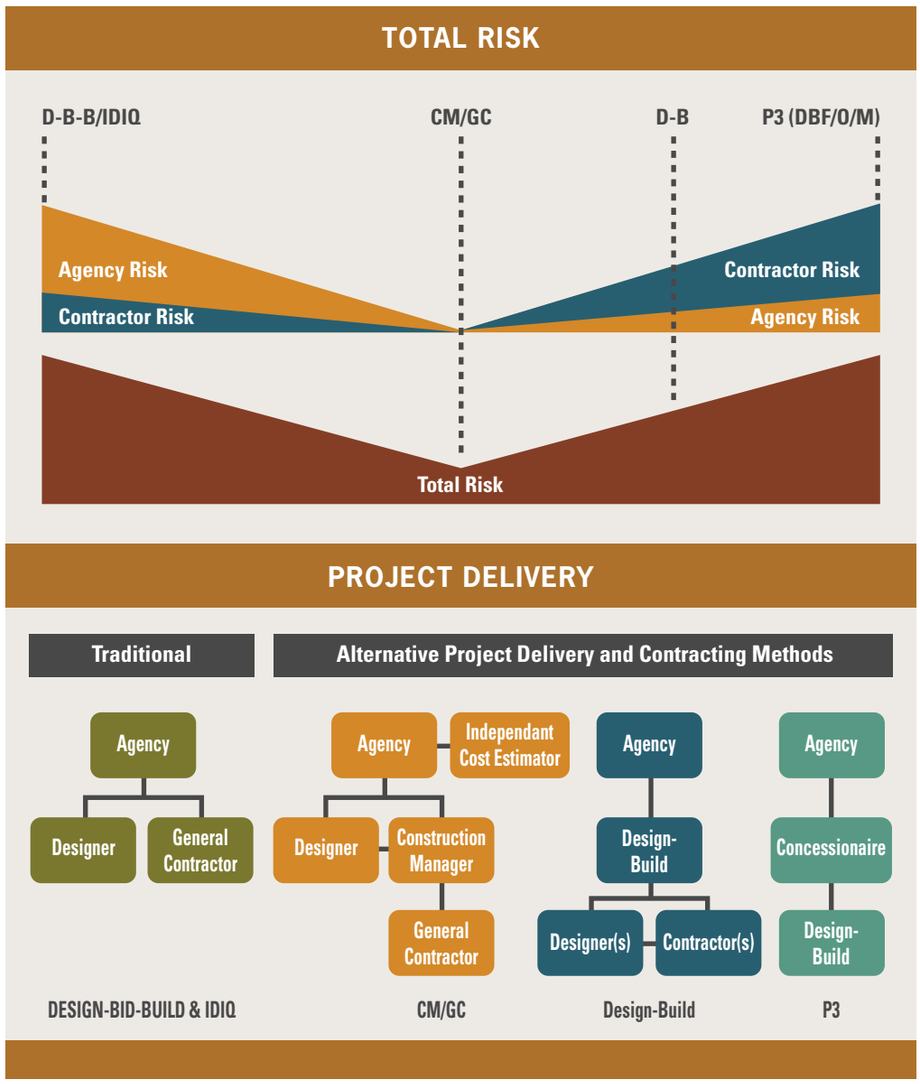
IO's paper went on to say that the "projects that may be considered for bundling are those that are contiguous, of similar scope, grouped in a defined geographical area or in locations separated by a considerable distance." Translation: one municipality, region, or county could be part of an initiative to remediate similar assets or the contract could cover more than one jurisdiction.

The U.S. Federal Highway Administration notes that bundling can streamline environmental analysis and permits, design, contracting, and construction. To enhance successful outcomes, dealing with many projects such as bridges with similar designs and age profiles will result in greater cost effectiveness due to standardization.

Pennsylvania's bridge replacement project

The state chose Plenary Walsh Keystone Partners to deliver this U.S. $1.12 billion project. Substantial completion was achieved in 2019 because the bulk of the bridges had similar dimensions and precast structures were used to minimize on-site time. At the outset, Pennsylvania provided permit approvals for the first tranche of projects and made process modifications relating to the *National Environmental Policy Act*.

Maximizing local content was an objective so the state was divided into sub-regions where construction and design firms had access to the tenders. In total, 18 different Pennsylvania-based contractors were involved in completing this project, with most construction personnel from local trade unions. Further, there was a boost to



Source: Applied Research Associates, 2020

Toronto's review of parking regulations welcomed by RCCAO

RCCAO is pleased that the City of Toronto is reviewing its parking regulations and considering removing the standard requirements for new developments.

This is something we have advocated for as times have changed and demand for parking continues to shift due to a decrease in vehicle ownership and increases in driving alternatives like ride-sharing and public transit.

Building parking adds to the cost of construction and results in increased housing prices. A single parking space can add $80,000 to $100,000 to the cost of housing in downtown Toronto. In addition, there is the ongoing maintenance cost for the parking space.

Toronto is looking at removing minimum parking requirements and instead imposing a maximum number of required parking spots in new developments, which would reduce the risk of a future oversupply of parking.

The city currently requires a minimum number of parking spaces based on the location and use of new buildings, which varies in different parts of the city. These parking requirements are not consistently applied and oftentimes are project specific. Removing minimum parking requirements will allow market trends to determine parking necessity.

We favour an approach similar to that taken by the City of Edmonton, called open option parking, which removes minimum on-site parking requirements and allows developers, homeowners and businesses to decide how much on-site parking to provide on their properties based on their particular operations, activities or lifestyle.

RCCAO is also advocating for increasing the use of above-grade parking, as digging deep into the ground can result in water issues, and adverse impact on stormwater capacity as well as creating a challenge for sewer infrastructure.

Above-grade parking is less expensive and, at the same time, allows for the repurposing of parking spaces if they become redundant in future.

Building above-grade parking also greatly increases the speed of construction and thus minimizes the disruptive impact. Anecdotal evidence suggests that, on average, two months of construction can be saved per parking level, which means that anywhere from six to 12 months could be shaved off a construction schedule.

Recommendations on changes to the zoning bylaw governing parking requirements are expected to be presented to Toronto's planning and housing committee in the fourth quarter of this year.

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the regional economy due to supply chain benefits. Construction materials were primarily sourced from suppliers and fabricators within the state.

A Design-Build-Finance-Operate-Maintain contract ensures that quality is high as the lead contractor is responsible for maintenance over a 25-year period following construction completion. When infrastructure is built to a high standard and properly maintained, it will have a longer lifespan. The consortium must hand back the bridges in a high condition rating.

This was the first P3 project in the U.S. to utilize a performance bond with an accelerated adjudication period, which S&P credited in its ratings rationale as providing greater certainty to investors.

In a "Lessons Learned" report, the transportation department estimated that replacing the structures using conventional contract procedures would have taken eight to 12 years. Instead, the construction program took about three and a half years, thus reducing impacts to the traveling public compared to a traditional delivery program.

Saskatoon's new bridge project

In 2018, the City of Saskatoon was honoured with a CCPPP gold award for the North Commuter Parkway & Traffic Bridge Project which was the first P3 bundled transportation project in Canada. This $240 million project contract was not only innovative but also fostered a partnership with Indigenous communities.

A new six-lane, multi-purpose bridge was renamed during the construction phase and pays tribute to Chief Mistawasis, the Cree Chief who signed Treaty 6, and is intended to represent reconciliation with Saskatoon First Nations. Indigenous workers were also on construction crews. Road extensions connect to a rehabilitated traffic bridge where a new steel-truss structure preserves its early 20th-century character while adhering to more rigorous safety standards.

Indiana's infrastructure rehabilitation project

Louis Feagans, managing director of asset management for Indiana's Department of Transportation is a proponent of project bundling but is seeking to improve decision making by moving from spreadsheet-type analyses to taking advantage of artificial intelligence (AI) and machine learning to inform the bundling program. According to Feagans, when AI is blended with expert review and other inputs to provide insight on unstructured data there are numerous benefits.

Among his takeaways on this approach: it saves time, it improves project selection, and it results in cost optimization. In fact, he said that the significant cost savings—such as the 27 per cent savings for the U.S. 50 Bridge Rehabilitation Corridor—are being redirected to other construction work.

Bundling small structures, bridges, and road projects into a corridor contract has resulted in coordination and mobilization benefits. While Indiana's department was quite eager to be the leader in issuing bundling tenders, Feagans indicated that there was push back from the contractor community. When too many bundles were released, contractors expressed that they could not handle the size of the projects.

> Project bundling provides an opportunity to fast-track construction delivery timelines and to do so at reduced costs.

In this instance, there is a parallel with Ontario's experience in 2013 when large bundles for the Eglinton Crosstown LRT resulted in a lack of bidders.

Feagans also warns not to mix interstate with non-interstate road projects; combining union and non-union workforces in a bundle can be problematic. He advises to select similar project types— historic bridges should be treated as standalone projects—and be cognizant about scheduling on a concurrent or consecutive basis.

Beyond bridges to broadband

Bundling in the U.S. market has moved beyond bridges to other asset classes. Applied Research Associates (ARA), a leader in advancing the bundling model, lists the following types of projects: roads, traffic signals, fiber optic and broadband networks, travel plazas, alternative fueling stations, and parking facilities.

In Kentucky, a broadband bundling project was awarded to install a 3,000-mile (4,828-km) fiber optic network along roads throughout the state. The program is nearly complete, but the first segments were operational in less than two years, and 13 other states are bundling broadband and fiber optic projects.

Branded as "KentuckyWired," the program will help pay for its construction in two ways: it will own its middle mile network rather than paying private companies, and it will lease half of its fiber strands to private companies. Productivity in government offices has already dramatically improved in rural areas where connectivity was problematic.

Where do we go from here?

The Canada Infrastructure Bank (CIB) has reinvigorated its mandate and its Growth Plan focuses on five areas where a positive impact could be made. Could the CIB partner with sub-national jurisdictions and its agencies to deliver bridge, broadband, or other infrastructure in an accelerated way? To generate revenue, will better methods be found to charge users of infrastructure?

Even though project bundling is not held out as a panacea, it is worth pursuing on a pilot project basis. To underline the earlier statement about limited municipal funding, the risk of deferred maintenance will be evident across all jurisdictions, but perhaps more so for small towns and in rural areas. This is an ideal time for senior orders of government to assist the hard-pressed municipal sector. If the CIB provides funding and program support for a trial in one or two jurisdictions and it is successful, the bundling approach could be replicated elsewhere and across different asset types.

When I asked Dan D'Angelo, principal engineer with ARA what he expects with President Joe Biden's administration, he responded: "I do expect bundling to become more popular due to the fiscal constraints governments face and even more so if there is an infrastructure economic stimulus program."

Project bundling will allow us to build and rehabilitate municipal infrastructure faster than we would under traditional procurement models. It has the potential to be transformative as we build back better during this economic and social recovery.

Andy Manahan is president of Manahan Consulting Services, a newly formed boutique firm with a goal of becoming a trusted advisor on infrastructure and development projects.

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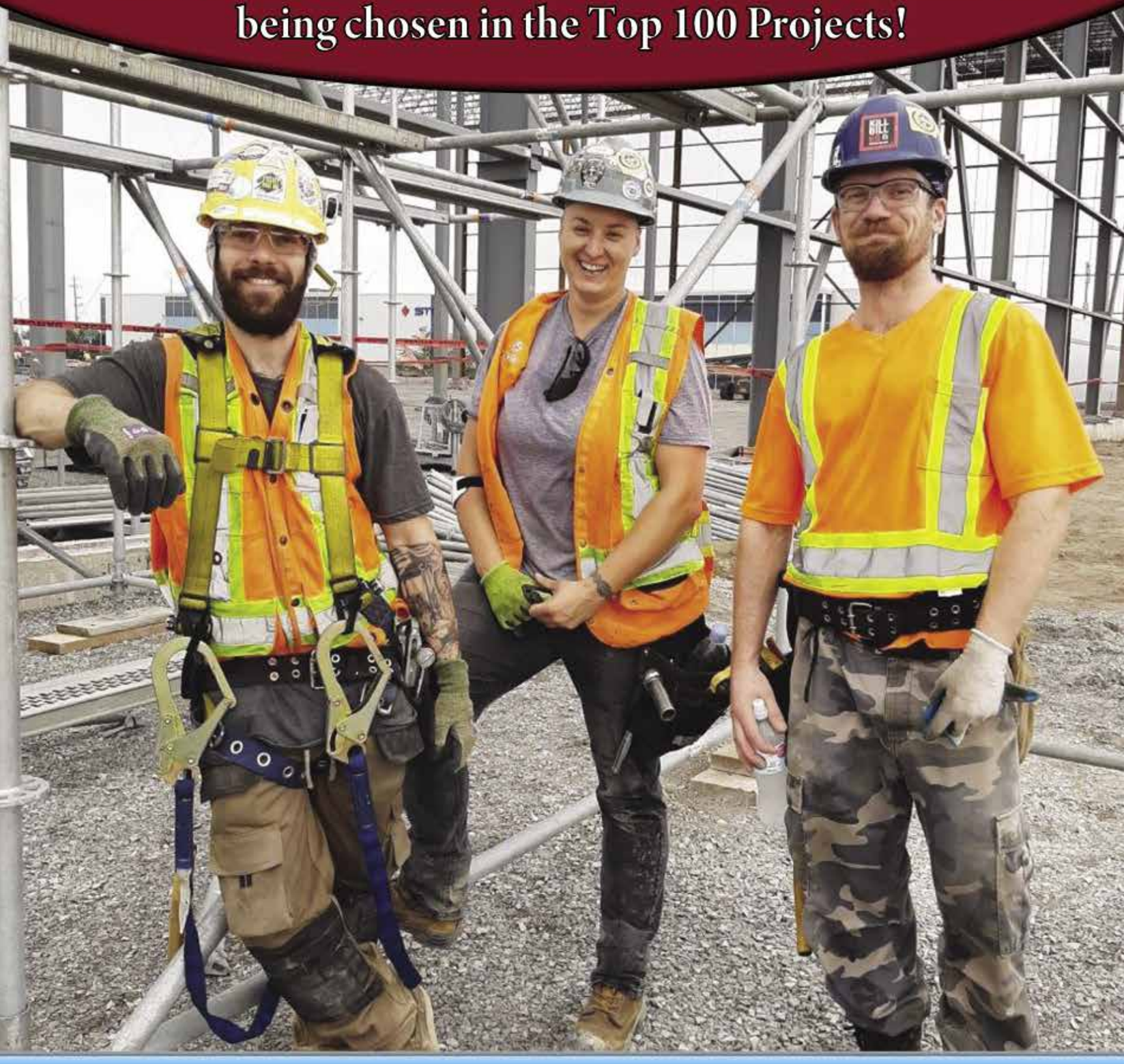

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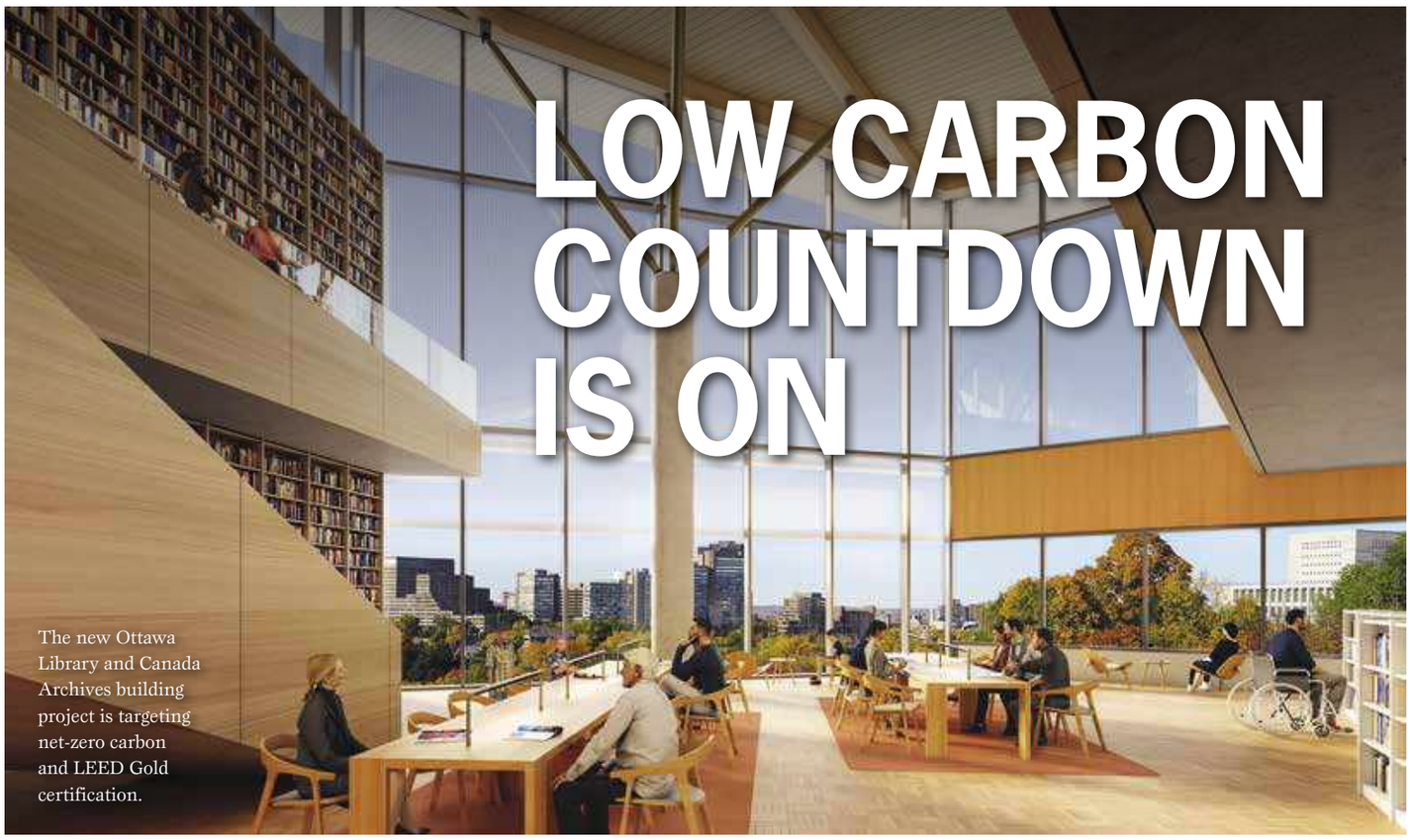


Credit: Diamond Schmitt Architects

LOW CARBON COUNTDOWN IS ON

The new Ottawa Library and Canada Archives building project is targeting net-zero carbon and LEED Gold certification.

Canada's new climate plan needs a consistent approach to net zero buildings.

By Ryan Zizzo

Canada can make progress towards its climate goals while supporting economic growth by moving beyond energy efficiency, ensuring new buildings are net-zero carbon and made from local, low-carbon, and carbon-storing materials. The federal government knows this and has crafted thoughtful and transformative requirements for new federal government buildings. Less thoughtful is its plan for other, non-government, buildings. To maximize efficiency, public and private sectors need a consistent approach.

Emissions reduction revolution

Canada's 2030 emissions reduction roadmap, entitled "A Healthy Environment and a Healthy Economy," was released in December 2020. The plan notes the Government of Canada will: "ensure new federal buildings are net-zero and that all major building retrofits will be low-carbon, reducing embodied carbon in construction projects by 30% starting in 2025, and ensuring 75% of domestic office floor space (new leases and lease renewals) will be in net-zero carbon climate resilient buildings starting in 2030."

These requirements are forward-thinking and best-in-class. They move beyond the outdated focus on energy efficiency and rather target carbon (including embodied carbon to manufacture construction materials), net-zero, and climate resiliency.

This new holistic life-cycle focus will push the industry forward. The federal government has the largest real estate footprint in the country and these changes will go a long way toward meeting Canada's climate goals including by setting the bar for "future-proof" climate-smart buildings. But we need this comprehensive approach to carbon applied to all buildings if we want to meet the country's emission targets, not just those of the federal government. The government should be setting similar requirements for commercial and large-scale building retrofits rather than simply focusing on energy efficiency, as the plan currently does. In other words, the same guidelines that apply to the public sector should apply to the private sector. To understand why, we need to dig a little deeper.

The carbon footprint of a building can be split into two major categories:

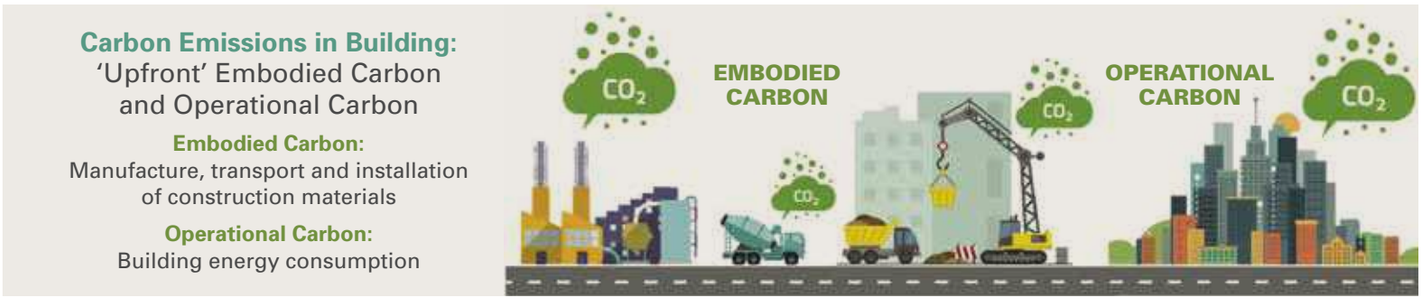
1. Emissions associated with operating the building, called "operating carbon."
2. Emissions associated with creating and maintaining the building; called "embodied carbon."

Operating carbon includes the emissions from ongoing building operations like heating, cooling, lighting, ventilation, plug loads, water use, and other operational loads. It depends on the efficiency of the building systems and the carbon intensity of the energy sources used.

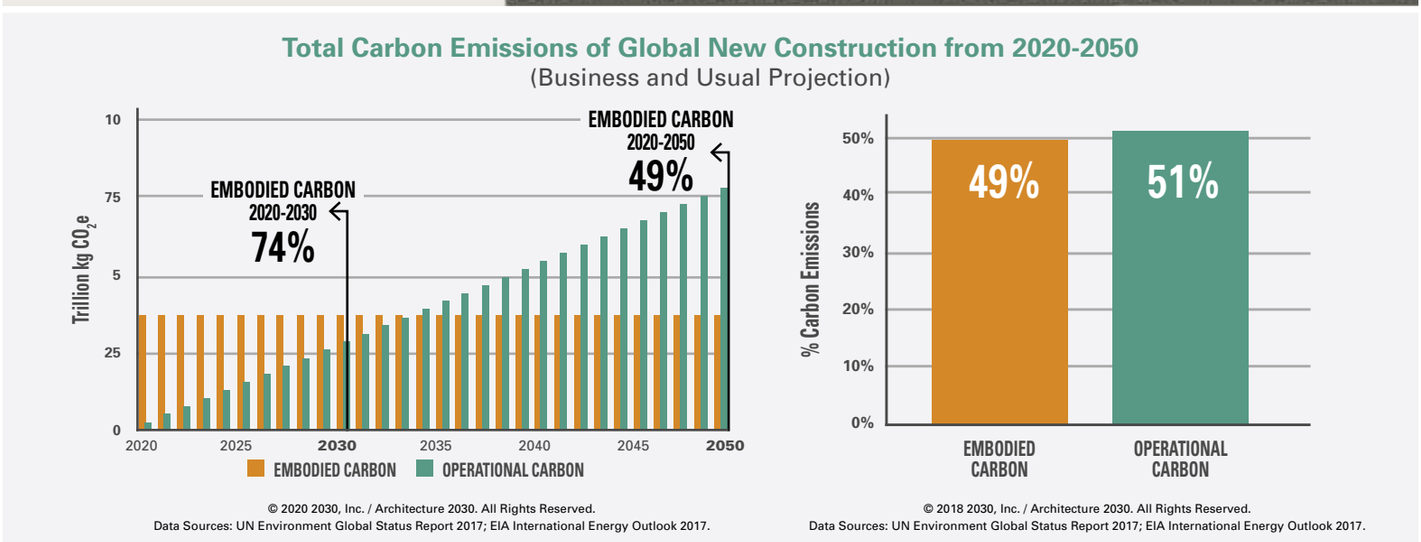
Embodied carbon includes the emissions associated with construction material harvesting, manufacture, and transportation, as well as those required to construct the building. These embodied emissions that occur pre-occupancy are called "upfront embodied carbon." Additional embodied carbon is emitted throughout the use of the building associated with materials and processes for maintenance, repair, rehabilitation, and further emissions associated with building end-of-life including demolition, dis-assembly, and final recycling or disposal of materials.

Operating carbon has been managed, via energy efficiency, for decades. Building codes across the country include minimum energy efficiency requirements that are made more stringent with each code update. This means new buildings today are significantly more energy efficient than the ones built decades ago. In addition, energy systems are decarbonizing with coal plants being decommissioned and replaced with lower carbon renewable energy. Even natural gas has a reducing carbon footprint as utilities begin adding renewable natural gas (created from biofuels) to their distribution networks.

Source: Stanska



Source: Architecture2030



Combined, these changes are significantly reducing the emissions associated with operating buildings.

As the amount of operating carbon continues to decrease, the other side of the carbon equation—the embodied carbon—becomes an increasingly big piece of the carbon pie. Recent studies by Architecture2030 have shown that globally, embodied carbon is expected to represent nearly 50 per cent of the carbon impact from new buildings between now and 2050. Various other studies have shown that the embodied carbon associated with typical commercial-scale new buildings in jurisdictions with low-carbon electricity, including Quebec, British Columbia, and Ontario is equal to roughly a decade-worth of operating carbon. That's a big carbon impact to be overlooked and left unregulated. Governments and policymakers including leaders in Vancouver and California are starting to roll-out requirements aimed at reporting and management of embodied carbon.

Examining low carbon life-cycle

Canada's green building strategy should aim to make both new construction and renovations comprehensively low carbon over their life-cycle and avoid simply shifting the carbon burden from operations to embodied. To illustrate, let's consider the example of an aging apartment building with an inefficient leaky building envelope. A strategy funded under the government's current plan to improve energy efficiency of large-scale buildings could see that apartment reskinned with large amounts of insulation and metal cladding. These additional materials should achieve the goal of increasing energy efficiency and would also likely reduce the operational carbon if the building uses carbon-intensive operating energy.

Those additional materials, however, likely have a large embodied carbon footprint, which is not considered if we only target energy efficiency. In this example, the overlooked embodied carbon emissions associated with the renovation might take decades to pay back from the resulting annual operating carbon savings—hardly a "carbon win" towards our 2030 climate reduction targets. Looking at energy efficiency or operational carbon savings without considering the embodied carbon is like considering investment returns but ignoring the up-front costs to buy-in.

For a comprehensive approach to future buildings, two paradigm shifts are required:

1. Shift our management metric from energy to carbon.
2. Shift our period of assessment from annual operating to whole life-cycle carbon (including both operating and embodied carbon).

These changes would reframe how buildings are designed and constructed. The upfront carbon footprint to construct the building would become part of the discussion and would be optimized, rather than ignored as it currently is on most projects. Once measured, designers will start prioritizing carbon-efficient or even carbon-storing materials, and the built environment can move from being a net carbon contributor to being a net carbon sink. This approach also prioritizes local materials to minimize transportation-related emissions and supports local jobs.

In the short term, all building programs (both public and private) should evolve their focus on energy efficiency to instead reduce life cycle carbon emissions, including embodied carbon. This approach ensures we don't retrofit our buildings with a large pulse of embodied carbon in the short term, only to achieve long-term carbon savings which could blow past our 2030 targets.

The government knows this—as demonstrated by its thoughtful new requirements for federal buildings. Now is the time to apply this knowledge more broadly to consistently craft carbon-smart solutions across all building programs, including for non-government buildings. We don't have any time to waste.

Ryan Zizzo is a professional engineer and founder of Mantle Developments, based in Toronto, Ontario.

Building a Brighter Future for Toronto's Waterfront

Artistic rendering of a proposed vision for the Quayside redevelopment project, which will be a mixed-use development featuring energy efficient buildings and a variety of public recreational areas, parks, and a new cultural centre. **— Staff**

Rendering by Standard Practice, courtesy of Waterfront Toronto.

Send us your best infrastructure image, and you may see it featured here. Email Interim Editor Connie Vitello at **connie@actualmedia.ca** for details.

UNPAVING PARADISE

Green infrastructure experts deliberate the policies needed to build back better.

By Connie Vitello

The Canadian government has informed the country of its plan to develop all future infrastructure through a green lens. This is a key pillar to the post-pandemic green economic recovery effort and has included several funding programs and streams dedicated to building (and renewing) public infrastructure assets which are less carbon-intensive and more resilient.

The Healthy Environment and a Healthy Economy plan is backed by $15 billion. Project investments under the first intake of the Green Infrastructure stream will address emerging priorities in water infrastructure, disaster mitigation, and climate change. The Canada Infrastructure Bank has earmarked $10 billion from its overall $35 billion current working budget for loan-based investments toward infrastructure deemed sustainable.

Natural Resources Canada is also establishing the Natural Climate Solutions Fund, which will invest $4 billion over the next 10 years, including $631 million to the Nature Smart Climate Solutions program. This will support projects that restore and enhance wetlands, peatlands, and grasslands to store and capture carbon.

In parallel to funding support, there is growing appreciation for, and accounting of, our municipal natural assets and the role that nature has in helping achieve our climate goals.

But there are still prevalent misconceptions and significant gaps to address, as traditional infrastructure funding schemes don't always suit the smaller and unique green infrastructure strategies that are needed across the country.

For example, Farmers for Climate Solutions is a national alliance of farmer organizations and supporters who believe agriculture must be part of the solution to climate change. They've recently asked the federal government for $300 million to help address their green infrastructure challenges and help them reduce agricultural emissions.

With the goal to better understand the policy and funding mechanisms necessary to assess and support the potential of green infrastructure projects, ReNew Canada gathered a group of experts for an InfraIntelligence discussion to uncover the struggles and try to come up with some solutions.

Defining "green infrastructure"

What exactly is green infrastructure? This is a seemingly straightforward question, but it led to a range of answers. While there was a consensus that there is a natural element involved, the definition of green infrastructure seems to vary.

Lara Ellis, a senior vice-president of policy and partnerships of ALUS (named after the Alternative Land Use Services program in 2020) has a strong opinion on the matter. Ellis works with farmers and landowners to find effective ways to grow community sustainability and resilience. She is currently focused on the development of ecosystem markets and support for natural infrastructure on agricultural lands, woodlands, and wetlands.

Ellis considers green infrastructure to be "natural infrastructure, so things that grow," such as trees, grasses, shrubs, wetlands, "which have all sorts of benefits," but also engineered components. For example, solar watering systems for cattle or technologies

Rooftop greenhouse garden in Montreal, Quebec. Green roof development, which involves the creation of "contained" green space on top of a human-made structure, provides a wide range of public and private benefits.

Credit: Halifax Seaport Farmers Market

Credit: ALUS

Top: The green roof features 10 different species of red and green sedum, and four rooftop micro turbines generate electricity.

Bottom: Projects like this alternative watering system in Parkland County undertaken by ALUS participants help maintain the integrity of wetlands and other riparian spaces. The benefits of these projects are manifold and cumulative within the watershed and contribute to flood and drought prevention in major urban centres such as Edmonton, which is downstream of this project.

to soak up nutrients for farmlands.

Steven Peck is president of Green Roofs for Healthy Cities, co-founder of the Green Infrastructure Foundation, and a prolific writer on green infrastructure issues for the past 20 years.

Peck's definition includes three parts. First, natural systems such as coral reefs and forests. Second, an engineered component that helps with farms and the urban forest. Third, systems that support the natural environment, such as sensors, solar, and other technologies.

> With the pandemic people are realizing how important it is to have healthy green space in their communities.

France Guertin concurs about the natural and engineered elements. Guertin is a senior technology manager of engineered natural technologies for Dow's Global Environmental Technology Center, implementing projects and tools that plan, manage, and invest in smarter, more productive systems that fit seamlessly within nature.

"Our journey with green infrastructure started in 2011," said Guertin. "We changed the terminology to 'engineered natural technology' rather than green infrastructure —sometimes hybrid solutions may be the best solutions."

Bailey Church, the leader of KPMG's National Public Sector Accounting Advisory service line, and KPMG's Global International Public Sector Accounting practice, has extensive experience working in public private partnerships and large infrastructure projects. Church has worked extensively with both the public sector and private sector on complex accounting matters related to the environment and natural assets.

He cautioned that the term "green infrastructure" is "loaded with a lot of different meanings and perspectives." Church leans toward the "engineered managed component" as distinguished from the natural environment.

Green infrastructure initiatives

"Working with farmers is important when we're looking at natural infrastructure because collectively they make up the largest private land holders in the country," said Ellis. "The problems that we have in Canada are exacerbated by climate change, but land use has also created problems that we can help rectify through natural infrastructure."

Ellis and her team are working on advancing awareness about agricultural policies that will help Canadian farmers mitigate and adapt to climate change, seeking to create a dialogue between farmers, the public, and decision-makers to find practical climate solutions.

Guertin points out that Dow has recently announced its corporate carbon targets and is working to offset facilities and undertake activities that have environmental benefits.

Church said we could be doing better about calculating natural assets, because decision-makers are better at accounting for environmental liabilities and contaminated sites. "We do a terrible job with accounting for our natural assets here in Canada and internationally," he said. "If we look at our accounting standards, we take a conservative view of what is actually recognized on the balance sheet."

Ellis argued that the calculations for natural infrastructure dollars should be more dedicated to more of a variety of green infrastructure initiatives—public and private projects that are providing benefits to the public and the environment.

"One of the problems is that a lot of the benefits and ecosystem services that are provided which are inherently fundamental to our health and wellbeing are not measured very accurately and even when they are measured, they're not often translated into monetary terms so we can do the proper accounting," said Peck. "That's a real challenge and there's only so far we can go with that in terms of the tools that have been developed."

It's absolutely critical that we have a clear line of sight on the value that natural assets bring, as well as a clear line of sight for our responsibilities for managing these assets.

The panelists all acknowledged that municipalities need to integrate a framework for evaluating and measuring natural assets options into infrastructure plans. The City of Ottawa and the Town of Gibson, British Columbia are two municipalities which are actively including natural assets like trees and wetlands on their balance sheets as part of their asset management planning, but more widespread initiative is needed.

Pecks cited a development in London, Ontario that is converting asphalt into a park where environmental benefits can be measured in terms of how much stormwater can be retained, the extent of air quality benefits, carbon sequestration, and the urban heat island reduction. This is the case that can be made to city council.

"We can make a pretty strong business case for investing a couple of million dollars for turning that parking lot into a park," said Peck. "But it's very difficult, for example, to measure the health and well being that have any weight and standing. So, despite the advantages of ecological economics there are fundamental limitations with the tools we're currently using."

On a federal level, Peck is adamant that green infrastructure should have its own dedicated funding strategy. The current bundles are arguably too large for a lot of the green infrastructure projects—they're not major highways and projects, and some of the time they are on private land, not public land.

"There's a hunger for that politically right now. With the pandemic people are realizing how important it is to have healthy green space in their communities," he said. "Billions of dollars need to be spent on green infrastructure, particularly in the urban areas across the country."

How much of the federal pot should be dedicated to green infrastructure? He suggests about 15 per cent of infrastructure spending. There was also a passionate discussion about the multiplier effect. A lot of the green infrastructure development is done regionally and locally, which lead to good jobs connected to these projects.

Guertin agreed and pointed out her experience with Dow's success in investing in natural assets to reduce capital costs and benefi communities. She has helped develop a quantification tool of benefits which demonstrates that the cost-recovery opportunities related to green infrastructure are significant.

Guertin cited an ash pond that Dow needed to remediate in Midland, Michigan along the Tittabawassee River, which flows through East Central Michigan in Saginaw and Midland counties. The contaminated floodplain of the river is located downstream of Dow headquarters and manufacturing plant.

The traditional strategy would be to cap and treat the site. Instead, they took advantage of a tool that Dow developed in conjunction with the Nature Conservancy to quantify ecosystem services. They challenged the project team to look at the possibility of excavating the ash that caused concern, putting the contaminated soils into a secure site not along the river, and transforming the site into a wetland with a riparian buffer.

Guertin emphasized that tools such as these are important to help make a case for the stacked benefits that can include water quality, carbon performance, habitat improvement, and biodiversity protection.

"I've seen a huge transformation in the past decade over how our company views the co-benefits of green infrastructure," said Guertin.

Next steps needed

There was consensus across the panel that the green infrastructure industry needs to build processes and data that can be provided to government and other stakeholders looking to invest in clear assets.

According to Church, the data has to have adequate rigour and processes behind them so they can be audited. "It's absolutely critical that we have a clear line of sight on the value that natural assets bring, as well as a clear line of sight for our responsibilities for managing these assets."

Guertin also advocates for making more of a business case for nature. She said that lifecycle assessments provide a nature scorecard, including quantification of ecosystem services.

Ellis agreed. "It's important that the living part of green infrastructure is living infrastructure, not just transit," she said. "Maybe there's a misconception in Canada because we have such abundance but in southern Canada it's becoming increasingly important to have more of a balance."

"We need to see more infrastructure dollars dedicated to living green infrastructure systems in cities in particular," emphasized Peck. "We're going to get a lot of bang for our buck in terms of jobs and wellbeing and resiliency if we do that."

GREEN INFRASTRUCTURE

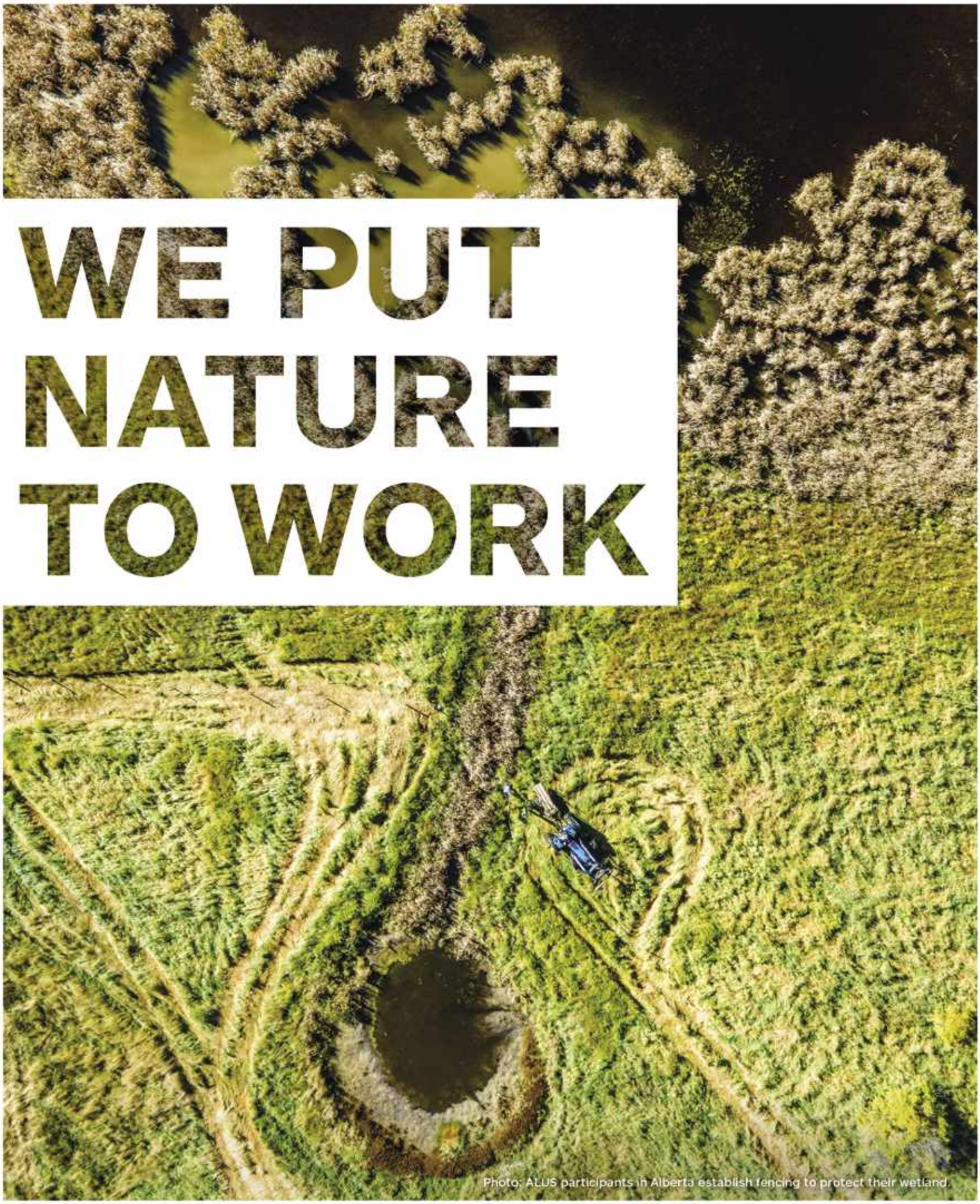
What "green infrastructure" projects should we be doing more of in Canada?

- Green Roofs 12.2%
- Bioswales 4.9%
- Stormwater retention ponds 0.0%
- Constructed wetlands 17.1%
- Permeable pavement 2.4%
- Urban forest renewal 4.9%
- All of the above 58.5%

What percentage of federal funding do you think is dedicated to living green infrastructure?

- 0% 8.8%
- 1%-10% 73.5%
- 10%-25% 2.9%
- More than 25% 14.7%

Connie Vitello is interim editor of ReNew Canada.



WE PUT NATURE TO WORK

Photo: ALUS participants in Alberta establish fencing to protect their wetland.

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FER-PAL Infrastructure completes an emergency watermain lining project alongside the City of Markham in Ontario to restore the life of a failing watermain.

Inset: A recent open-cut project image provided from a project site in Ontario, courtesy of the Ontario Sewer & Watermain Construction Association.

Main photo credit: FER-PAL Infrastructure. Inset credit: OSWCA.

RENEWING WATER INFRASTRUCTURE

Solutions coming down the pipe to help address asset renewal.

By Simran Chattha and Connie Vitello

The construction of water infrastructure across the country has accelerated in recent years. Canada's latest Core Public Infrastructure Survey found that an average of approximately 13,000 kilometres of new linear water assets were built per year in 2017 and 2018, compared with around 6,000 kilometres per year from 2000 to 2016.

Municipalities are continually thinking about how to renew and repair this critical infrastructure. As municipalities address their infrastructure needs, new technologies and existing methods are poised to play a pivotal role. However, some methods are more commonly used and recognized than others for a variety of reasons.

Open-cut trench excavation and trenchless rehabilitation, most often the cured-in-place pipe (CIPP) method, are among the methods that are commonly being used by municipalities. What are the benefits and drawbacks of these methods? What are the variables that should be used to select one method over another? Let's explore these questions.

Replacement versus rehabilitation

After watermains are put into service, their structural integrity and hydraulic performance will eventually start to deteriorate. Structural deterioration can be caused by a number of reasons. For example, metal-based pipes develop internal and external corrosion, causing the pipe walls to thin or degrade. This can, in turn, cause the watermain to eventually leak or bust.

Various options are available to repair and/or renew linear water infrastructure.

One option is open-cut trench excavation, which is the traditional method that has been used for lateral sewer construction, repair, and replacement. This method involves excavating down to and exposing the existing pipe so that it can be repaired or replaced and then backfilled.

The advantages of using this method are that it can have a lower cost in unpaved areas compared to other methods, it can be used in cases where there is a collapsed or severely

broken pipe, and there's no need to remove roots or debris from the pipe.

However, there are also disadvantages of using this method. More excavation is required with this approach when compared to other methods. This option may also require the removal of street and sidewalk pavement, which increases repair expenses and creates inconvenience for the community.

Trenchless rehabilitation, particularly CIPP, can also be used to repair existing pipelines. It is a jointless, seamless pipe lining within an existing pipe. The process of CIPP involves inserting and running a felt lining into a pre-existing pipe that is the subject of repair. Resin within the liner is then exposed to a curing element to make it attach to the inner walls of the pipe. Once fully cured, the lining acts as a new pipeline.

A major advantage of this method is that it doesn't require excavation. The disadvantages can include the need to make sure the liner size needed is available for a particular pipe (when not a common size) and the need to facilitate a bypass of the flow in the existing pipeline while the liner is being installed. It is also considered by some as more of a temporary fix than a long-term replacement method. However, others report that certain CIPP projects can provide an additional 100 years of life.

Patrick McManus is executive director of the Ontario Sewer & Watermain Contractors Association (OSWCA), which represents over 750 companies across Ontario, including contractors, manufacturers, distributors, and consulting engineers. They collectively perform over $1 billion a year in capital projects to ensure safe drinking water and environmentally responsible wastewater treatment and disposal.

According to McManus, typically, open cut and tunnelling are the preferred options. "Pipe relining is a relatively new offering and becoming much more widely used but still considered to be a niche," said McManus. "It's another tool in the toolbox that temporarily provides more life for already buried infrastructure with minimal disruption and excavation."

However, deciding on the best option for a particular municipality really depends on the objective and circumstances of that municipality, stated McManus.

"This is not an either-or decision," said Stewart Dickson, director of conveyance with WSP in Thornhill, Ontario. "Rehabilitation and replacement are both valuable methods of pipeline renewal that can be implemented, independently, or jointly."

Key variables to consider

When it comes to linear water infrastructure, how do municipalities and water infrastructure owners decide how to rebuild or renew their pipelines?

In Canada, there is currently a preference for open-cut as trenchless options are still mainly in the development and acceptance phase. Many of the projects today are still being led by designs favouring open-cut solutions. However, the consulting industry does evaluate trenchless proposals and is awarding alternative trenchless when it is evaluated to have the lowest total installed cost.

"There are various reasons that one option may be more desirable than another," explained Dickson of WSP.

He advises his clients to consider the following:

- **Project objectives:** Understanding client goals and overall objectives for the project is critical to establish the preferred renewal strategy.

- **Site constraints:** Site constraints have the ability to preclude one option of renewal. Perhaps there is sensitive surface infrastructure that can't be disturbed or complex sub-surface conditions that will influence the preferred renewal approach.
- **Budget:** Most of WSP's clients are municipalities who will budget for upcoming projects years in advance. It is important to understand which methods of renewal can be accommodated within their budget.
- **Schedule**: A project may need to be completed within a certain timeframe, due to other upcoming work. Or perhaps the work has presented itself under an emergency situation, requiring immediate attention. This project constraint may make one or more options of renewal preferable.

Barry Kelly, a consultant with Assetic, an asset management software company, acknowledges that the decision-making process can be complicated and that it all depends on the project, and the balance of priorities involved.

"I'm seeing a trend that municipalities are getting better at looking beyond just that one project," said Kelly. "They're getting more information so they can make information-based decisions."

He points to the big picture that includes transportation projects, other infrastructure projects, and factors such as the growth of that area, the age of, and the conditions of the pipes.

David Crowder, a senior associate at RV Anderson, also notes that there a number of variables that need to be balanced. "Several variables are reviewed when considering rehabilitation or replacement of a buried asset," said Crowder. "This could include depth, diameter, age, water material, and watermain usage (industrial, residential, or hospital)."

"Depending on the diameter, pipe material, condition, and age of the watermain, we first consider what rehabilitation technologies are available to extend the life of the buried asset," added Crowder. "We suggest that a desk top study be completed to determine if rehabilitation or open cut should be considered."

Geoff Britnell, business development manager at FER-PAL Infrastructure, added that there are direct and indirect costs to consider. The direct costs have to do with the financial savings of the projects.

"The indirect costs are really what we're talking about when it comes to variables," said Britnell. "That's every other impact that can come from the project that isn't necessarily financial. It could be trees, disruption to a neighbourhood, disruption to traffic, and disruption to business."

> What is the environmental cost to do a project with open-cut versus rehabilitation?

While there don't seem to be any easy answers, there are certainly a few key variables to consider.

It comes down to dollars and cents, according to Gregory Baird, president of The Water Finance Research Foundation. "Open cut is more expensive with the traffic and road replacement. But a rehab many times may not be feasible," said Baird.

Geography is also a key variable when deciding on project strategies. Regionally, a big inhibitor seems to be geological conditions and the lack of knowledge of subsurface conditions. When dealing with rock, it drives cost up for both the contractor and the customers. However, in places such as the Greater Toronto Area, there are not as many geographic challenges, and most owners and regulators are aware and accepting of trenchless technologies.

In Halifax Regional Municipality, Halifax Water is using a combination of open-cut replacement and rehabilitation in the wastewater collection system work, but open-cut replacement is the main linear water infrastructure renewal method.

"Trenchless rehabilitation methods of non-structural cleaning and spray-on lining, structural lining, and non-structural pull-through liners have been used on occasion," according to Jamie Hannam, director of engineering and information services for Halifax Water. "Conversely, trenchless CIPP is the predominant method utilized for gravity sewer rehabilitation versus open cut."

The key variables Hannam considers when deciding between using an open-cut versus a trenchless method include: the total project cost, the effectiveness of the solution (i.e., whether it re-stablishes original design performance and estimated service life), and access to the infrastructure for construction (whether the pipe is accessible for open-cut). For example, pipes that are located under a highway or railway make trenchless solutions more enticing and affordable relative to open-cut options.

As environmental awareness increases, trenchless can be an attractive option. From no idling traffic to no cutting of trees, trenchless is becoming a more viable option as it is better understood. Along with this, the new methods of preparation and installation allow for less steps and complexity of the rehabilitation program.

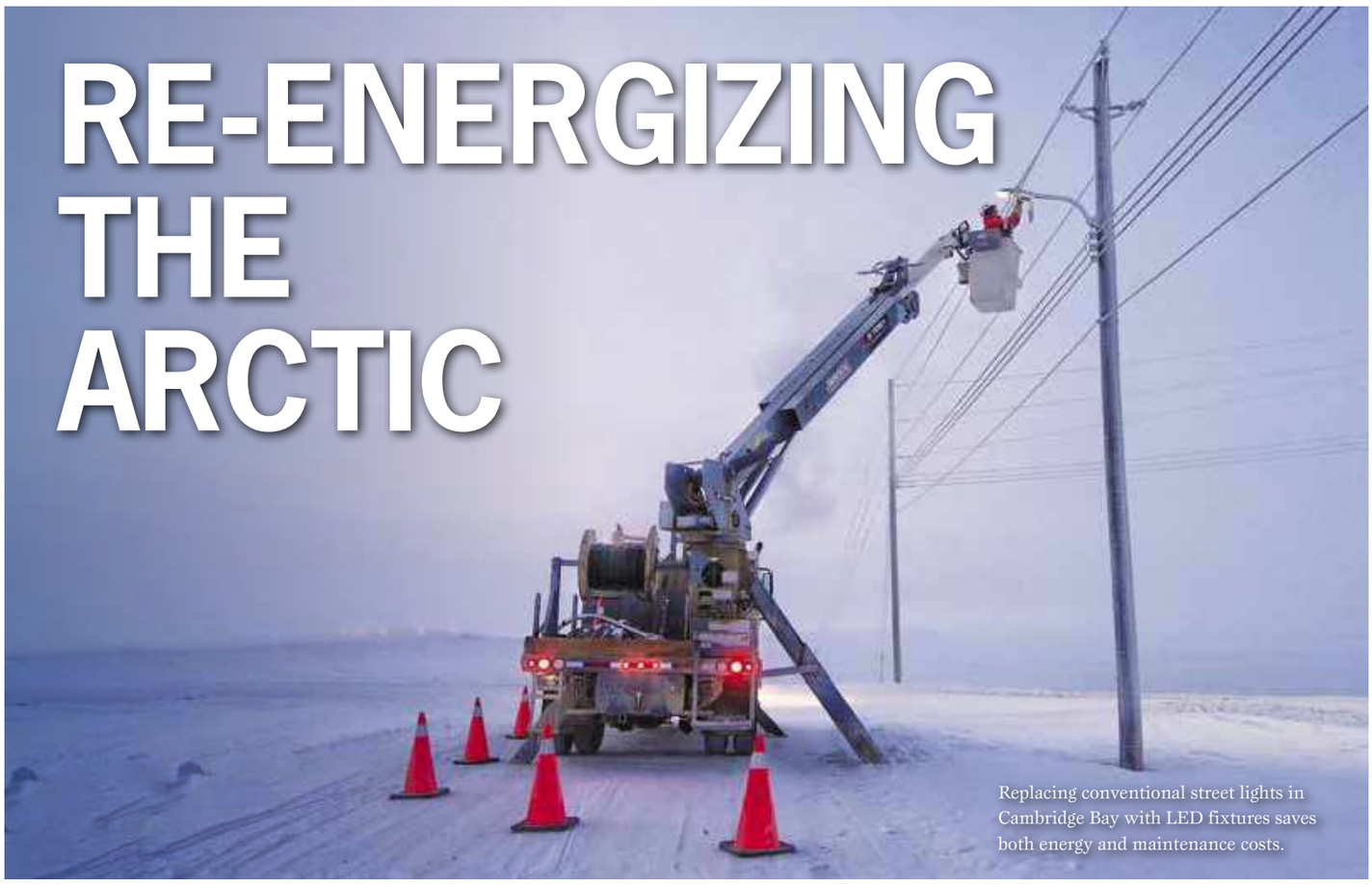
Britnell of FER-PAL notes that trees in particular are an important consideration. A 100-year-old tree can't be replaced so there's a consideration about whether a project can use a method that will leave the tree intact.

"[Environmental considerations] haven't necessarily played a strong role in the decision-making process yet, but I think it's something we all recognize is coming relatively fast in the near future," remarked Britnell. "That is, what is the environmental cost to do a project with open-cut versus CIPP or rehabilitation? A lot of it comes down to what's above the watermain or utility you're looking at replacing."

ReNew Canada intends to take a closer look at this issue through a survey with environmental and engineering consultants across Canada to inquire about their current practices and opinions related to the management, design, and procurement of linear public sector water infrastructure in Canada. We will be reporting on the results in the next edition. Stay tuned.

Simran Chattha is interim editor of Water Canada magazine and Connie Vitello is interim editor of ReNew Canada magazine.

RE-ENERGIZING THE ARCTIC



All photos: QEC

Replacing conventional street lights in Cambridge Bay with LED fixtures saves both energy and maintenance costs.

Nunavut's Qulliq Energy Corporation is carrying out an extensive energy renewal program.

By Carroll McCormick

This fall the Arctic sealift company NEAS (Nunavut Eastern Arctic Shipping Inc.) will unload four 60-tonne diesel generators at the little hamlet of Arctic Bay, located less than 100 kilometres from the northern tip of Baffin Island. This will be the third sealift of building materials, mechanical, and electrical components for a $32 million power plant replacement that will bump the installed capacity to 1,680 kilowatts.

The old power plant dates to 1974. NEAS delivered the first shipment of 2,145 tons of building materials and heavy construction equipment on August 30, 2020. The new plant is scheduled to come online in 2023.

Nearly every kilowatt hour of electricity Qulliq Energy Corporation (QEC) produces for its 15,000 customers in 25 hamlets and communities across the territory comes from its 25 diesel power plants, with a total installed capacity of 76,000 kW. The oldest of them dates to 1967. As of 2014, only three were younger than Nunavut itself, which was carved out of the Northwest Territories and created in 1999. Some can no longer meet peak demand; for example, the old Arctic Bay power plant has 620 kW of installed firm capacity, less than the 2017-18 peak demand recorded of 678 kW.

Renewing northern power

In May 2019, the federal government committed $175 million to help replace or rebuild six power plants and upgrade eight generator sets by 2025-26.

"Replacing QEC's aging infrastructure with new technology falls under the corporation's mission to provide safe, reliable, and efficient power supply," said Rick Hunt, QEC's president and CEO. "All QEC's new power plants feature hospital-plus-grade silencers to reduce noise pollution, scrubbers to reduce GHG emission and easy integration of future renewable energy."

They are also being built further from the hamlets to further reduce noise pollution and are future-proofing the plants with extra generating capacity. "For every new power plant project, QEC considers the forecasted energy needs of the community," said Hunt.

QEC's steady march toward its replacement goals started with a major upgrade to its power plant in Iqaluit, the territory's capital, in 2014. The first replacement plants came online in 2017 in Qikiqtarjuaq, Taloyoak, Pangnirtung, followed by a generator upgrade in Kinngait in 2018, and a plant replacement in Grise Ford in early 2019. That May QEC announced it would install eight new diesel generators in Rankin Inlet, Coral Harbour, Chesterfield Inlet, Pond Inlet, Clyde River, and Whale Cove.

> New energy efficient technologies will help reduce Nunavut's carbon footprint and improve environmental impacts.

Examining and implementing clean energy

QEC is going a step further than just replacing diesel generators and plants.

It is designing the new plants so they can accept hybrid technology, which for now means solar.

The north is terribly dependent on diesel fuel to generate electricity, to the tune of about 50 million litres burned by QEC alone. Years ago, there had been some hope that QEC might be able to ease its diesel fuel tab with hydroelectric power, which would have been a first for Nunavut.

The idea, which picked up traction in 2012, was to set up a public-private partnership (P3) deal to build a dam, at a cost of $150 to $200 million, about 85 kilometres outside of Iqaluit. But after spending $10 million on studies and engineering work, QEC abandoned the plan in 2016 after the price tag had risen to between $300 and $500 million, according to a 2016 CBC report. Looking west to Site C in British Columbia and Keeyask in Manitoba, and Muskrat Falls to the east in Labrador—three mega-dams with mega price tags—shelving the dam project may have been the best outcome.

Wind turbines have been tried, with some success, in the Arctic, including two in Kugluktuk (formerly Coppermine), near the border with the Northwest Territories. The windmills were operated under QEC's predecessor, Northwest Territories Power Corporation, and failed in 2000 before the establishment of Nunavut Power Corporation. Lightning struck one and the other perished, it was supposed, from a lack of maintenance.

Wind surveys have identified promising areas and various parties have been planning more wind turbines; Northern Energy Capital is working with Inuit organisations in the Kivalliq region to build a two-megawatt wind farm in Rankin Inlet. Agnico Eagle signed a memorandum of understanding with Sakku Investments Corporation & Northern Energy Capital to develop a 12 MW, Inuit-owned, wind turbine project.

For now, however, QEC is looking to solar panels to supplement diesel.

In 2016 QEC completed a solar photovoltaic panel demonstration project at the Iqaluit power plant, with a 2.86 kW nameplate capacity. It has yielded, according to QEC, "promising results." Still in operation, QEC says of the project, "It [has] produced 13,400 kWh of power, offset 9.4 tons of CO2 emissions, and displaced approximately 3,000 liters of fuel."

A notable first—notable because all the replacement power plants are being built so they can one day integrate renewable energy systems—is poised to happen in Kugluktuk. This hamlet of some 1,500 souls, way off in western Nunavut, relies on a vintage plant built in 1968 that QEC has marked for replacement. Targeted for completion in March 2024, the new plant, which will be QEC's first hybrid solar/diesel operation, will include a proposed 500-kW solar energy system and battery storage and serve to supplement the four new diesel generators. (Kugluktuk already has some experience with solar photovoltaic panels, having installed some on its recreation complex in 2016.)

Qulliq Energy Corporation is beginning to supplement its power generating capabilities with solar arrays.

"The Kugluktuk power plant project is still in [the] design phase. The solar equipment supplier will be known once the construction tender is awarded," said Hunt.

The financing of the power plant will be 75 per cent covered by the Arctic Energy Fund, and 25 per cent by QEC. The cost of the solar system is being shared between the Arctic Energy Fund (35 per cent), NRCan's Clean Energy for Rural and Remote Communities (40 per cent) and QEC (25 per cent).

But even before any renewable energy is added to the mix, the new generators, which come from suppliers such as CAT, MTU and Volvo, will use less diesel than the old ones, according to Hunt. "Manufacturers continue making more energy and fuel-efficient generators. QEC continues to monitor generator performance to measure actual fuel efficiency within our infrastructure … By integrating modern energy efficient technology into all power plant replacements, the corporation is building a strong foundation to deliver cleaner long-term energy solutions that benefit Nunavut."

Referring to the new power plants in Grise Ford and Kinngait, but applicable as well to QEC's other new power plants, Hunt noted, "The power plants' renewable energy integration capability will allow for opportunities to move our territory toward clean technologies should funding become available."

On the electrical consumption side of the coin, QEC has achieved energy savings by replacing conventional street lights with LED, or light-emitting diode, technology. Not only do LEDs consume much less electricity, they also last far longer than incandescent bulbs, reducing the labour costs associated with bulb replacements.

QEC recently completed replacing the street lights in Resolute Bay, Grise Fiord, Pond Inlet, Igloolik, and Kugaaruk. The LED replacement program will be extended to the rest of Nunavut by 2024.

The combination of these new energy efficient technologies will help reduce Nunavut's carbon footprint and improve environmental impacts.

Carroll McCormick is a freelance writer based in Montreal, Quebec.

Credit: Borea

The Blue Hill wind power facility project in Saskatchewan was unique in that it required a helicopter to help install the tower. Borea is building a switching station and a power line to connect the wind facility to the grid. The 35-turbine project will be complete in late 2021.

POWER TO THE PEOPLE

Contemplating the complex issues involved in energy development.

By Connie Vitello

To avoid the catastrophic effects of a warming climate, Canadians are actively transitioning to a net-zero economy by 2050. The *Canadian Net-Zero Accountability Act*, along with the previous commitment to phase out traditional coal-fired power generation by 2030, has prompted infrastructure decision-makers to help deliver emission reductions and come up with cleaner, greener technologies to power the Canadian way of life.

Renewables are a cornerstone in the government's plan to meet Canada's climate change commitments. Canada's new $15 billion strengthened climate plan includes an ambitious agenda to support renewable energy sources such as wind, tidal, and solar. The plan includes additional investments of $964 million over four years to advance smart renewable energy and grid modernization projects, as well as $300 million to transition rural, remote, and Indigenous communities that currently rely on diesel to clean, reliable energy.

It seems an energy transformation is on the horizon. This bodes well for the energy infrastructure development industry, and for our pocketbooks. A recent report by the independent Canadian Institute for Climate Choices analyzed multiple pathways to achieving net-zero emissions by 2050 and found that, in all scenarios, Canadians will spend a smaller portion of their income on energy costs, including home heating and transportation, in 2050.

As Canada continues to add energy capacity to the grid, almost every province and territory has new assets under development. The solutions are being driven by a combination of power companies, energy developers and, increasingly, government policies and initiatives.

When faced with the decision to develop new power assets, what is the driving force behind the choice that is made? Do municipalities have the information needed to make the best decision possible based on short-term and long-term costs, or are they at the mercy of the preference of the power utility that services their community?

ReNew Canada recently gathered a panel of experts to answer these questions and provide their perspectives on how communities can understand the best possible solutions based on technology, geography, and grid capacity.

Examining energy costs

The price of energy is influenced by fixed and variable costs. For example, the price of building transmission wires is a fixed cost, while the price of the fuel used for generation is variable. The distance that electricity has to travel over the transmission and distribution system from the generation source to the customer also influences the final price.

Access to natural resources and generation

Credit: Borea

The solar project in Suffield, Alberta recently achieved substantial completion. Borea helped build the province's first ever solar project using bifacial technology and a solar tracking system, which will increase grid reliability during the winter months.

facilities also plays a part in the cost of energy, alongside overall population density. Often, in remote areas, more infrastructure is required to deliver energy from the generation source to homes, businesses, and communities, as the cost is shared among fewer customers.

All things considered, there has never been more momentum for appreciating the beneficial side of funding renewable energy development in Canada, and few know this better than Murray Westerberg.

The electricity sector in Canada will change more in the next five to 10 years than it has changed in the last 100 years.

Westerberg is a director for the western division of Borea Construction, a subsidiary of Pomerleau Construction. He manages a variety of major energy projects from the design phase, construction, and onward to make them as cost feasible as possible.

Since 2006, Borea has completed 65 renewable energy projects across Canada, producing 5,785 megawatts of capacity—or about one third of Canada's renewable energy construction. Enough energy to power approximately one million Canadian homes.

The company currently has 11 projects underway. Westerberg says that the location of much of his work has shifted over the past decade, from big renewable procurement projects in Ontario to smaller clean energy projects in Alberta. He also points out the emergence of new technology over the years, such as bifacial solar modules. (Bifacial solar modules can produce power from both sides of a bifacial module, increasing total energy generation, and they tend to be more durable.) "This is an example of an innovation that is becoming an industry standard, improving efficiency and maximizing energy output," said Westerberg.

Julia St. Michael of Enwave Energy Corporation has also seen a lot of change in recent years. In 2017 she became the company's first director of sustainability. She has been steadily connecting government and policy makers, building operators and managers, within the green building and sustainable energy community, helping them to identify new opportunities for projects and partnerships. The company currently provides services in several cities in Canada and the U.S.

According to a United Nations Environment Programme report, cities account for 70 per cent of the world's energy consumption. Almost 50 per cent of that energy is used for heating and cooling. And district energy systems are one of the most effective ways to mitigate climate change.

St. Michael pointed to a variety of projects: biomass, ice storage and cool lake water for cooling downtown cores, a waste to energy facility, geothermal for residential development, and more. In early February, Brookfield Infrastructure Partners announced an agreement to transition ownership of Enwave to new investors, a major milestone in the company's journey.

How is cost driving energy solutions?

Jean-François Nolet is a vocal advocate for the renewable energy transformation. As vice president of policy, government, and public affairs at the Canadian

Renewable Energy Association (CanREA) he is passionate about CanREA's vision of ensuring wind energy, solar energy, and energy storage play a central role in transforming Canada's energy mix.

How can Canadians accelerate the energy transition and do it in a cost-effective and reliable way? Nolet pointed to the decreasing costs of renewables, the strong emergence of energy storage technology, and the electrification of the economy.

Westerberg concurred that the costs of renewables have come down dramatically. What's driving the cost decrease in particular? The technology. When it comes to wind, the turbines are taller. When it comes to solar, the tracking systems are less expensive. The cost of the modules has also dropped dramatically. He sees solar diving a lot further in the next few years, which will bring it on par with wind.

St. Michael also emphasized the environmental targets, mandates, and funding programs that are helping to make the renewable market more attractive. "The carbon tax will be a major driver as a disincentive to continue doing what we're doing and an incentive to reduce costs and go to the low carbon solution," she said.

"Our sweet spot is finding and investigating solutions that have never been done before. We have partners that want to undertake sustainable projects so we're going for the 'gold nugget' solutions that are both sustainable and cost efficient," said St. Michael.

The panelists recognized that these ideas are gaining more traction with the mainstream, who are increasingly interested in value creation as it pertains to a triple bottom line.

He added that if Canadians are to meet our climate targets and have a carbon neutral economy by 2050 "we need to identify solutions that provide clean and renewable electricity when and where it is consumed."

According to Westerberg, the least costly provinces to construct renewable energy projects are Alberta and Saskatchewan. He pointed to the combination of natural resource conditions that are favourable for both solar and wind installations, but also the topography and the make up of the soils, primarily flat land masses of sand and clay. In addition, he pointed to the qualified labour and the competitive rates for workers in Alberta compared to other jurisdictions.

Conversely, in British Columbia, it's more difficult to build around the forests and fisheries, and to blast rock. These factors can be cost prohibitive.

Nolet stressed that local employment requirements are beneficial and should be transparent in the final analysis when it comes to project planning.

> The fact that people are investing in energy stocks is great, but you can't build unless there is someone from utilities purchasing the power.

Nolet also pointed to the growing number of pension funds and institutional investors who are recognizing that renewables kept their promise to deliver reliable and low-cost electricity.

Influencing factors

Geography is also a major factor when municipalities are making decisions about their energy development projects.

"For our business, the location is key," said St. Michael. "Our municipalities are massive supporters and partners, and we rely on them for permitting." The nature of district energy developments is specific to the location, to heat and cool the businesses in that location, to "recycle and upcycle" energy where it exists.

Nolet assessed that municipalities and cities are playing a huge role going forward. He pointed to the increasing number of renewable projects in urban centres, including rooftop solar, coupled with storage and district energy, electric vehicles, smart grid, new artificial intelligence solutions.

"The electricity sector in Canada will change more in the next five to 10 years than it has changed in the last 100 years," stated Nolet. "That's the level of disruption that's currently happening."

With all these drivers and incentives, why does renewable energy still make up so little of the overall energy mix? (Approximately 11 per cent in Ontario.)

Westerberg chalked it up to a lack of procurement from the provinces, whereas St. Michael pointed to the extensive project planning requirements

"As electrification takes effect, and people start buying more electric vehicles I'm optimistic that there will be programs in the coming years where they will forecast that demand and see that people need more energy," said Murray. "But at this point in time the fact that people are investing in energy stocks is great, but you can't build it unless there is someone from utilities purchasing the power."

Nolet would like to see stronger support from the federal government. "We need to address the elephant in the room: if we want a net zero grid, what do we do with gas?"

ReNew Canada and the InfraIntelligence panels will continue to provide coverage on these compelling issues.

Connie Vitello is interim editor of ReNew Canada.

BUILDING RENEWABLE ENERGY INFRASTRUCTURE IN CANADA

What is the single biggest influence to building renewable energy infrastructure in Canada?

- Project costs for construction and transmission **0.0%**
- Regulations/Government Policy **21.4%**
- Shift to non-fossil fuel-based solutions/GHG reduction **14.3%**
- Local generation vs. Grid **0.0%**
- Community buy-in and public support **0.0%**
- All of the above and more **64.3%**

Which of the following energy sources hold the most promise to meet Canadian future energy demands?

- Solar **46.2%**
- Wind **0.0%**
- District Heating/Cooling **0.0%**
- Hydro **0.0%**
- Nuclear **15.4%**
- Oil, gas and coal **0.0%**
- A combination of all of the above **38.5%**

INFRAIntelligence

DIGITAL CONVERSATIONS WITH INDUSTRY LEADERS

EXPERT INSIGHTS INTO THE FUTURE OF INFRASTRUCTURE

UPCOMING 2021 DISCUSSIONS

CANADA’S NUCLEAR FUTURE – MAY 27

Nuclear energy is here to stay in Canada, providing a key part of the low-emissions energy portfolio in two provinces.

Are there opportunities for other provinces to develop larger nuclear assets, or has the time for that opportunity already passed? Three provinces are already working on small nuclear technologies. Could others follow suit as they see the potential implementation opportunities for the technology? What about waste diversion, especially with the cancellation of the Deep Geologic Repository in Ontario?

We’ll explore these questions and more as we look to appreciate Canada’s nuclear future.

BARRIERS TO MASS TIMBER INFRASTRUCTURE – JUNE 24

It’s been two years since ReNew Canada sat down with mass timber industry leaders from across the country to discuss opportunities and challenges for future asset development. Since then, one of the industry’s cornerstone projects in Canada has been cancelled (Toronto’s Quayside development) but several other projects have begun development.

With changes to the building code now allowing for taller wood development, we’ll discuss the challenges and opportunities now available. From supply chain development and public education to fire resistance and long-term durability, we’ll discuss what needs to happen for mass timber projects to become a part of the everyday development landscape.

To suggest a topic or speaker for an upcoming discussion, contact **Connie Vitello** at **connie@actualmedia.ca**.

To learn about sponsorship opportunities for future events, contact **Nick Krukowski** at **nick@actualmedia.ca.**

ReNew CANADA

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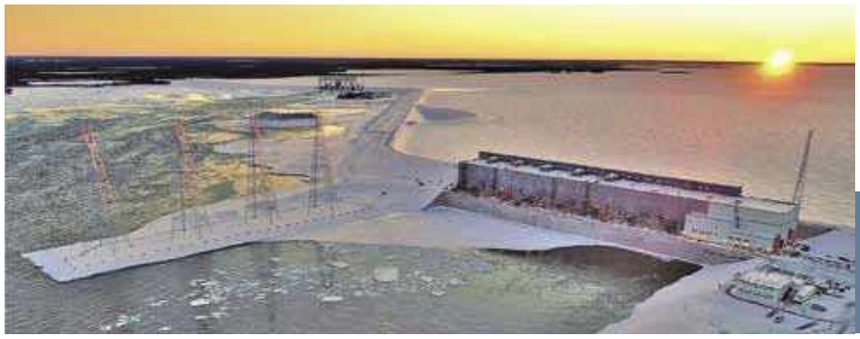
Credit: Manitoba Hydro



Keeyask Complete Ahead of Schedule

2021 Top100 Projects Rank: 9
Value: $8.7 billion

Keeyask, Canada's newest hydro project, is complete six months ahead of schedule. A further six units will be added in the coming months. The plant will produce an average of 4,400-gigawatt-hours of electricity per year, enough electricity to power 400,000 homes.

The Keeyask Generation Project is a collaborative effort of the Keeyask Hydropower Limited Partnership—consisting of Manitoba Hydro and four partner First Nations: Tataskweyak Cree Nation, War Lake First Nation, York Factory First Nation, and Fox Lake Cree Nation. The generating station is located on the Nelson River approximately 30 kilometres west of Gillam, in the Split Lake Resource Management Area and within the ancestral homeland of the four First Nations.

"First power from Keeyask builds on Manitoba Hydro's enviable position in the low carbon world of the future," said Jay Grewal, president and CEO of Manitoba Hydro.

The Keeyask mega-project has been running ahead of its control schedule by working year-round through sub-arctic winters (down to -40° C), and more recently the pandemic. The joint venture project team of Bechtel, Barnard, and EllisDon have been employing innovative logistics measures and tools.

The electricity generated at Keeyask will not only power homes and businesses in Manitoba, but also allow Manitoba Hydro to meet its export commitments in both Canada and the United States.

"This is a significant milestone in this iconic renewable project. Producing electricity six months ahead of schedule whilst navigating the challenges of COVID-19 is a tremendous accomplishment and testament to the dedication of each and every member of the Keeyask team," said Kelvin Sims, Bechtel's infrastructure general manager, Americas.

Credit: Metrolinx

Proponents Identified for Eglinton Crosstown and Scarborough Subway Projects

Eglinton Crosstown West Extension:
2021 Top100 Projects Rank: 17
Value: $4.7 billion

Scarborough Subway Extension:
2021 Top100 Projects Rank: 21
Value: $3.56 billion

Infrastructure Ontario (IO) and Metrolinx have identified Strabag and West End Connectors as the First Negotiations Proponents (FNPs) to design, build, and finance the tunnels for the Scarborough Subway Extension and the Eglinton Crosstown West Extension projects.

Identification of the FNP is the first step in the negotiations process. IO and Metrolinx will work with each team to finalize the details of their RFP submissions to ensure that each team has a proposal that provides the best value for the province.

Upon successful conclusion of this process, each team would then proceed towards financial close of a contract this spring.

IO and Metrolinx's approach is designed to speed up construction of the tunnels. At this time, during negotiations with IO and Metrolinx, each team is permitted to undertake certain design and early works for the projects, with potential for early on-site construction mobilization at the Scarborough site. Tunnel boring is expected to begin next year.

FNP for the Scarborough Subway Extension – Advance Tunnel Contract

The Strabag team includes:

- **Applicant Lead:** Strabag AG.
- **Construction Team:** Strabag Inc.
- **Design Team:** Arup Canada Inc., Brian Isherwood & Associates Ltd.
- **Financial Advisor:** Strabag Inc.

FNP for the Eglinton Crosstown West Extension – Advance Tunnel Contract

The West End Connectors team includes:

- **Applicant Lead:** Aecon Infrastructure Management Inc., Dragados Canada Inc., Ghella Canada Ltd.
- **Construction Team:** Aecon Infrastructure Management Inc., Dragados Canada Inc., Ghella Canada Ltd.
- **Design Team:** TYPSAInc., EXP Services Inc., Dr. G. Sauer & Partners Corporation, Pedelta Canada Inc.

- **Financial Advisor:** ACS Infrastructure Canada, Aecon Concessions, Scotiabank Capital, Ghella Investments & Partnerships.

Of the shortlisted teams invited to submit bids, the FNPs were the highest ranked after the proposals were evaluated. The teams were evaluated based on criteria identified in the Request for Proposals process that began in August 2020. Criteria included design and construction methodology, approach to managing the project and the collaborative behaviours of key individuals of the proponent teams.

The Scarborough Subway Extension Advance Tunnel scope of work includes:

- Tunnelling works for the 7.8-kilometre subway extension, from Kennedy Station to McCowan Road/Sheppard Avenue.
- Design and construction of launch and extraction shafts, tunnels, as well as headwalls for emergency exit buildings and stations.
- Supplying the tunnel boring machine and installing segmental precast concrete tunnel liners.
- Activities necessary to build the tunnel (including utility relocations, supports for shaft and headwalls, temporary power supply, lighting, ventilation, and drainage).

The Eglinton Crosstown West Extension Advance Tunnel scope of work includes:

- Approximately six kilometres of tunnelling for the 9.2-kilometre extension.
- Design and construction of launch and extraction shafts, tunnels, as well as headwalls for emergency exit buildings and stations.
- Supply tunnel boring machines and install segmental precast concrete tunnel liners.
- Activities necessary to build the tunnel (e.g. utility relocations, supports for shaft and headwalls, temporary power supply, lighting, ventilation, and drainage).

"Aecon is proud to bring our industry leading heavy civil expertise combined with our capabilities in successfully building world-class urban transportation systems to deliver this critical infrastructure," said Jean-Louis Servranckx, president and chief executive officer of Aecon Group Inc. "We look forward to working with Infrastructure Ontario, Metrolinx and our partners on this important extension to Toronto's transit system."

APPOINTED

Angela Clayton

Angela Clayton joins Infrastructure Ontario (IO) as the president of the project delivery team. Clayton is returning to IO after working five years with one of IO's partner companies – Plenary Americas. During her time with Plenary, she led the group charged with overseeing design, construction, operations, and maintenance of all Plenary buildings across North America.

"Angela's expertise and influence are recognized across the industry," according to **Michael Lindsay,** who previously held this role and was promoted to president and CEO of IO in the fall. "She has been a key member of the influential industry organization, the Future of Infrastructure Group, advising Infrastructure Minister, the Hon. Laurie Scott, on various industry issues, including IO's evolution."

A strong advocate for diversity in the industry, Clayton has been a member of the Women's Infrastructure Network (WIN) for the past eight years and currently sits on the Toronto Chapter steering committee.

Ray Bassett

The Canadian Construction Association (CCA) announced that **Ray Bassett** is the chair of the 2021-22 board of directors. Bassett is a 37-year veteran of the construction surety industry, having led both claims and underwriting practices for leading national surety companies in Canada. He is focused on improving collaboration and value among stakeholders in the construction industry.

Bassett joined the CCA Board of Directors in 2010, has chaired the Manufacturers, Suppliers & Services Council, as well as an executive committee focused on federal prompt payment, which was instrumental in having industry concerns and recommendations addressed in the *Federal Prompt Payment for Construction Work Act*.

In his address to members at the annual general meeting, Bassett articulated one of CCA's advocacy focuses for the association over the next year: "[We need] a long-term federal infrastructure plan, that is evidence-based, and is better aligned with the needs and priorities of provincial and municipal governments, and has a clear and uncluttered funding mechanism—this will bring more public and private projects to the market in a more predictable flow," said Bassett.

The CCA also thanks outgoing chair, **Joe Wrobel**, for his dedicated leadership.

Rock-Anthony Coco

John MacKay

The Ontario Road Builders' Association (ORBA) and the Ontario Asphalt Pavement Council (OAPC), a council of ORBA, announced new leadership. **Rock-Anthony (Rocky) Coco**, the president of Coco Group, was elected president of ORBA.

A native of Windsor, Ontario, Coco joined the leadership of Coco Group in the 1990s and has helped position the family business founded in 1964 to become one of the largest construction companies in Canada. "I am very honoured to have been elected as ORBA's president as we enter the association's 94th year," said Coco.

Meanwhile, **John MacKay**, the general manager for GTA Construction and Materials Engineering at Aecon Infrastructure, has been chosen to chair the OAPC.

MacKay has been involved with OAPC and its precursor, the Ontario Hot Mix Producers' Association (OHMPA), since 1998. He has more than a quarter century of experience in construction, having obtained his start with Lindsay, Ontario's KJ Beamish Construction at the age of 17.

"It is through the strength of exemplary work of the council, and the association we will build upon our success and will continue to face challenges that lie ahead, just as we worked together to overcome the unprecedented challenges of this past year," said MacKay.

Nadia Todorova

Nadia Todorova has been appointed executive director of the Residential and Civil Construction Alliance of Ontario (RCCAO), a leading industry advocate for infrastructure investment and labour management.

"On behalf of the directors of RCCAO, I would like to congratulate Nadia on her appointment as executive director," said board chair **Peter Smith**. "She has been an integral part of our organization for almost three years now and has proven herself to be a tireless advocate for Infrastructure and issues that are important to Ontario's construction industry and our many employees."

Todorova had been interim executive director for the past several months and prior to that led government relations work for RCCAO for almost three years. She has extensive advocacy experience and is well-versed in the policy development process, having authored numerous reports in her previous roles as senior policy analyst with the Ontario Chamber of Commerce and policy analyst with the Ontario Road Builders' Association. She has also worked as an economist for the Ontario Ministry of Infrastructure.

"Although the pandemic has created challenges, I see many opportunities for RCCAO's growth and success. I look forward to leading RCCAO as it continues to make a significant positive impact on Ontario's infrastructure agenda," said Todorova.

Iain Rankin

Geoff MacLellan

Iain Rankin was sworn in as Nova Scotia's new Premier on February 23, 2021. His 16-member cabinet, in revamped roles and departments, support his focus on infrastructure, climate change, and population growth.

"The changes made in government today are a first step in fulfilling my promise to put the province on track for a successful economic recovery from the global pandemic," said Rankin.

Geoff MacLellan will lead the new Department of Infrastructure and Housing. MacLellan is a 10-year veteran of the Nova Scotia Legislature, representing the constituency of Glace Bay. He was first elected in a June 2010 by-election and served as economic development critic for the official opposition from 2010-2013. He was re-elected in 2013 and entered the Executive Council of Nova Scotia as the Minister of Transportation and Infrastructure Renewal.

The Department of Transportation and Infrastructure Renewal becomes Transportation and Active Transit, with **Lloyd Hines** remaining as minister.

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CNAM 2021 CONFERENCE: MAY 10-13




CNAM 2021 CONFERENCE

REFOCUS

THE ROAD AHEAD

MAY 10-13 2021 | VIRTUAL

The conference agenda includes Tereo Award program and special Networking activities.

There's still time to Register!

CNAM 2021 CONFERENCE AGENDA

Monday, May 10
Conference
Half-Day Kick-Off

Tuesday, May 11
Conference Full Day 1

Wednesday, May 12
Conference Full Day 2

Thursday, May 13
Conference
Half-Day Closing

CNAM Canadian Network of Asset Managers

The past year has been challenging in many regards with the onset of COVID-19 and a world pandemic. Many municipalities across the country, and the world over, are struggling to do more with less in terms of asset management.

Connect with us online as we reflect on the past year and set our sights on refocusing and determining the way forward in lieu of the challenges that face us.

The conference will focus on virtual streams such as: AM 101, Organization and People, Long Term Sustainable Financial Planning, Climate Change—Adaptation and Mitigation Strategies, Operations and Maintenance—Infrastructure Development, and French Language Content

Enhance your asset management knowledge and expand your personal network by participating in presentations, workshops, and networking in a virtual environment. It is a unique opportunity to learn from our peers and to navigate the obstacles that lie on the road ahead of us.

We're thrilled to introduce **Brian Burke**, *President of Hockey Operations, Pittsburgh Penguins, Sports Analyst, Community Activist and Mentor* as one of our Keynote Speakers.

Agenda Details and Registration at cnam.ca

The Valley Line Southeast LRT, Edmonton's most significant city-building project to date, continued with construction progress during the pandemic.

Credit: Government of Alberta

BACKBONE OF REGIONAL RECOVERY

By Bruce Ferguson

When the global coronavirus pandemic took hold and lockdowns began, it felt as if the world stood still. But outside continued a familiar echo: the sounds of construction building our cities. While the COVID-19 public health guidelines changed how we work, sharpening our focus on sanitization and physical distancing, that work never stopped—and it meant across the country, including here in Edmonton, thousands of people could continue to earn a living through one of the most challenging economic times in recent memory.

Take, for example, Edmonton's ambitious plans for LRT expansion. The LRT is the backbone of our transit system and plays a crucial role in city building by contributing to density, the development of transit-oriented communities, and our strategic goals of building a healthy, sustainable and connected city. But there's another benefit: these projects have kept people working through the pandemic, and better position the city—and region—for recovery. With Edmonton's Metro Line Northwest extension kicking off construction last summer, it meant jobs and their resulting economic benefits through the construction period, expected to last until 2024-25.

Or take the 27-km Valley Line, Edmonton's most significant city-building project to date. The 13-km southeast leg is under construction and progressed significantly over the past year as we approach service commencement, including installation of the new 59-metre steel Kâhasinîskâk footbridge and the delivery of our 26th and final light rail vehicle. All along the route, stops and stations are taking shape and public art installations are bringing this line to life.

While COVID introduced new challenges to the project, TransEd, the project's contractors, quickly adapted. Custom 3D printed face shields, new satellite training facilities, and cleaning and physical distancing protocols kept the project on track during the difficult and uncertain early days of the pandemic, keeping hundreds of workers employed and leading to the most project progress in a single construction season to date.

The project's second leg, Valley Line West, was in procurement when the pandemic hit and pivoted to a fully virtual process, receiving accolades from proponents for embracing our online tools. Procurement concluded in December 2020 with the selection of Marigold Infrastructure Partners for the design and construction of the 14-km extension. An economic assessment of the project estimates it will generate 8,800 jobs in Alberta and 2,700 in the rest of Canada and roughly $769 million in total wages. It's precisely these types of benefits that have made public transit projects so important both during the pandemic and after.

Across the country we're seeing similar investments, as leaders turn to public infrastructure to help spur economic activity and get Canadians back to work. And while those benefits will be immediate, strong public infrastructure will serve our cities for decades to come.

Bruce Ferguson is branch manager for LRT expansion and renewal for the City of Edmonton.

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