

ReNew

November/December 2018

C A N A D A

The Infrastructure Magazine

- + Taming Turcot
- + The Colour of Money
- + Green Parking

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BOLD IDEAS

HOCHTIEF PPP Solutions North America and its sister company Clark Builders are proud to be delivering the Stanton Territorial Hospital Redevelopment Project in Yellowknife, a new 27,000-m² state-of-the-art hospital. The new facility is being constructed adjacent to the current hospital without disrupting clinical services. Although the original indicative design proposed refurbishing and extending the existing building, HOCHTIEF, Clark Builders and their partners instead developed an alternate design to construct a new hospital and repurpose the old building for use by local businesses and agencies.

HOCHTIEF provides equity for the development, investment and long-term asset management of numerous public-private partnership projects. Founded in Yellowknife, Clark Builders provides general contracting, design-build and construction management services across Western and Northern Canada. Globally, HOCHTIEF and its affiliates have successfully delivered more than 55 P3s and are currently responsible for 22 social infrastructure and 11 transport infrastructure long-term concessions. www.hochtief-solutions.com | www.clarkbuilders.com



8



20



24



28



12

ReNew

CANADA

The Infrastructure Magazine

NOVEMBER/DECEMBER 2018

POLITICS

8 On a Mission
New Minister of Infrastructure and Communities Francois-Philippe Champagne discusses his goals for the portfolio leading up to the 2019 election.
By Andrew Macklin

PARTNERSHIPS

12 Taming Turcot
How the project team came together to minimize traffic impacts on one of North America's most complex transportation projects.
By Eric Vaillancourt and Sylvie Gervais

16 Strategic Redevelopment
Can municipalities use urban brownfield redevelopment to create solutions for affordable housing?
By Grant Walsom and Marlene Coffey

18 ABC for P3
The use of Accelerated Building Construction can improve megaproject development, if we are open to the opportunity.
By Brian Hall

20 International Influence
The success of Canadian companies in the development of public-private partnerships is leading to new global opportunities.
By Mark Romoff

GREEN BUILDING

24 Green Parking
Working with companies who manage and develop parking assets to transform these facilities using green, resilient, and sustainable solutions.
By Andrew Macklin

FINANCE

26 A Model for Success
Building an effective P3 model, one that limits risk and improves flexibility, is the solution for building successful infrastructure projects.
By Kevin Li

28 The Colour of Money
Understanding the present, and future, of green bonds and how they will continue to impact infrastructure development.
By David Stevens and Gaurav Gopinath

LEADERSHIP

30 Pursuing a Dream
A national association is helping women pursue their dream of working in the renewable energy sector.
By Allison Annesley

TOP100 PROJECTS

32 2019 Top100 Projects Preview
Discussing the issues and trends that will impact the megaprojects listed in the 2019 Top100 Projects report.
By Andrew Macklin

35 Top100 Projects Update
North Shore Wastewater Treatment Plant, Muskrat Falls, Alberta Carbon Trunk Line, Gordie Howe International Bridge, and the Grande Prairie Regional Hospital.

DEPARTMENTS

4 Editor's Note
Andrew Macklin discusses the StatScan survey.

5 Front
Andy Manahan and Giovanni Cautillo believe excess soil is an asset we shouldn't waste.

22 Panorama
Air Support

38 People & Events
Appointments, announcements, company news, and event reports.

42 Closing Shot
Bill Eggerston wants the industry to develop common language on renewables so that targets can be understood, and met.



STATSCAN SURVEY: DATA AND POLICY GAP

By Andrew Macklin

The release of the Statistics Canada Core Public Infrastructure Survey Results in late August provided some concrete numbers on the state of infrastructure in Canada, and where the greatest need for infrastructure rehabilitation can be found.

According to the August 24 media release, the data released will “provide trusted and reliable data to support governments and policy makers in monitoring the condition of Canada’s core public infrastructure, improving their management and lifespan, and developing future infrastructure projects.”

That has left industry stakeholders scrambling in an attempt to understand how federal decision-makers might use the data to drive billions of dollars in future infrastructure spending across Canada. But there are factors that do not look to have been considered in the collection of this data set from Statistics Canada.

For starters, there is no information comparing the quality of a community’s infrastructure versus the annual rate of investment in asset management and rehabilitation. The danger is that those communities with lower quality infrastructure could qualify for more government funding even though the issue may stem from under-investment at the municipal level. Those communities that have prioritized infrastructure rehabilitation would be then penalized for doing so, rather than funded equally or greater as they, in all fairness, should be.

There should also be red flags raised based on the generic evaluation terms used to generate the quality of asset statistics. As this country does not

have a universal asset management system in place nationwide, evaluation criteria could be looked at quite differently from one municipality to the next. One community’s ‘poor’ could be another’s ‘fair’.

Sure, there is only so much they can ask in a StatsCan survey before those filling it out decide its too long and abandon the process all together. But when you state after the fact that the data will be used to impact, potentially, billions of dollars worth of spending decisions, you have to do the survey right.

There has to be a better way. First, it’s worth understanding just how much of a municipality’s budget is spent on infrastructure. That has to be factored in. It needs to be asked of each community surveyed and has to be verified with some sort of documented proof. That investment should be weighed against the quality of the community’s infrastructure assets using some sort of pre-determined formula.

As for the question regarding condition, I wonder if this is the opportunity to discuss the need for nationalized asset management. The data from asset management plans, ones that the federal government has direct access to, would provide common data using the same system of evaluation.

It’s too early to tell just how this latest StatsCan data will be used. But if the government wants to use this to influence spending, then clearly more work needs to be done. *

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Precast concrete can accelerate the building of bridges, highways, and public buildings. Read more on page 18.

FUNDING FOR NEWFOUNDLAND/LABRADOR



Minister Champagne and Premier Ball sign the bilateral infrastructure agreement.

Newfoundland and Labrador Premier Dwight Ball announced the signing of a bilateral agreement with the Government of Canada under the Investing in Canada Plan that will provide more than \$555 million in federal funding over the next decade for community infrastructure projects.

The funding announced as part of the agreement focuses on four key areas:

- **\$109,071,324** for **public transit**;
- **\$302,364,807** for **green infrastructure**;
- **\$39,768,539** for **community, culture, and recreation infrastructure**; and
- **\$104,638,175** for **rural and northern communities**.

The projects supported through this agreement will involve contributions from the provincial, federal, and municipal governments and other partners. A call for applications for potential projects will be made by the provincial government in the weeks ahead.

NEXT ISSUE: JANUARY/FEBRUARY TOP100 PROJECTS ISSUE

Top100 Overview

Our analysis of the 2019 Top100 Projects report.

Outlook 2019

The stories that will make headlines in 2019.

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EXCESS SOIL IS AN ASSET WE SHOULDN'T WASTE

By *Andy Manahan and Giovanni Cautillo*

It's hard for people to imagine what happens with the soil that comes from infrastructure projects. Do they really spend any time thinking about that at all? For most, probably not.

Maybe they should: every year, thousands of trucks driving around Canadian metropolitan areas haul "excess soil" from transit developments, sewer and watermain projects, road building, among other civil infrastructure sites. While this term is commonly used within construction and government circles, it incorrectly implies that this soil is a waste.

We want to change the perception so it is considered a valuable resource. Soil hauled from road projects contains only minor amounts of salt from winter road treatment but this can easily be reused on site or at nearby construction sites.

Reuse happens rarely but this needs to change as there is an incredible volume of soil generated in Ontario from infrastructure and building sites every year: almost 26 million cubic metres. This is enough dirt to fill Toronto's Rogers Centre 16 times. About \$2 billion is spent annually to manage this soil in Canada's most populous province.

A lot of the money that municipalities and taxpayers are spending could be saved through better upfront planning and the implementation of best management practices (BMPs).

In our opinion, one of the biggest issues is hauling soil long distances only to be dumped. Large quantities of soil are often transported 60-100 kilometres away to these designated areas. In fact, one contractor reported that he dumped soil 125 kilometres away. Is this efficient?

But when there is coordination early in the project planning stage, potential reuse sites can be identified—saving a lot of money, time, and resources. Whenever possible, this soil should be reused on site as native backfill. In fact, a 2016 report from the Ontario Society of Professional Engineers (with support from GTSWCA and RCCAO) found that implementing BMPs for construction soil resulted in average cost savings of nine per cent.

There are multiple benefits to minimizing truck travel: fewer trucks on the road means less wear and tear to our thoroughfares; fewer greenhouse gas emissions are pumped into the atmosphere; and perhaps most noticeably, it keeps big vehicles out of traffic—which is important to improve safety and reduce congestion within a busy road system such as that in the Greater Toronto and Hamilton Area.

Ontario's Ministry of the Environment, Conservation and Parks is currently reviewing draft regulations to help enhance ways to manage soil on building and infrastructure projects across the province. We believe a multi-ministry approach—environment, municipal affairs, transportation, infrastructure, and others—will also help to achieve a more coordinated effort.

Visit soiil.com to watch our three-part series "The Real Dirt on Dirt: Solutions for Construction Soil Management" and learn more about soil matching. 🌱

Andy Manahan is the executive director of the Residential and Civil Construction Alliance of Ontario. Giovanni Cautillo is the executive director of the Greater Toronto Sewer and Watermain Contractors Association.

Provincial transit priorities are likely the biggest change in infrastructure priorities under the CAQ, as they have already rejected plans for the Montreal Pink Line.



THE NEW QUEBEC

By Andrew Macklin

The Liberal dominance in Quebec has come to a crashing halt, after the Coalition Avenir Quebec secured a majority government in the October 1st provincial election. Minus an 18-month hiccup that saw the Parti Québécois capture a minority government, the Liberals had been in power of the 125-member National Assembly of Quebec for 15½ years leading into the campaign.

At dissolution, the Liberals had a commanding 68 seats, with the Parti Québécois (PQ) sitting second with 28 seats and the Coalition Avenir Quebec (CAQ) in third with 21 seats. However, those numbers changed dramatically on election night, with the CAQ capturing 74 seats for an 11-seat majority, the Liberals relegated to 32 seats, the Quebec Solidaire with 10 seats, and the Parti Québécois with nine.

Here is how key players in the former Couillard cabinet fared on election night:

- **Premier Philippe Couillard: RE-ELECTED**
- **Minister for Transport
Véronique Tremblay: DEFEATED**
- **Minister of the Environment
Isabelle Melancon: RE-ELECTED**
- **Minister of Transport, Sustainable Mobility
and Transport Electrification
André Fortin: RE-ELECTED**
- **Minister of Education
Sébastien Proulx: RE-ELECTED**
- **Minister of Health and Social Services
Gaétan Barrette: RE-ELECTED**
- **Minister of Energy and Natural Resources
Pierre Moreau: DEFEATED**

The 2018 Quebec election was a once-in-a-lifetime campaign, as the issue of sovereignty failed to find its usual dominance as a frontline issue. Instead, it was taxation, immigration, health care, transit, transportation, and education that figured prominently in the election dialogue.

On the infrastructure front (Quebec does not have a dedicated Minister of Infrastructure), transit and transportation were focal points for the CAQ campaign. On the transit portfolio, Premier-elect Francois Legault made it well known that he did not support Montreal mayor Valerie Plante's plan for the multi-billion-dollar Pink Line, but is interested in the potential of expanding the under-construction Réseau express métropolitain. He also expressed interest in rural road and highway development, including the extension of Highway 19 in Laval.

If the CAQ chooses to follow the previous government's lead, we should have a clear picture of the party's infrastructure priorities with the release of the 2019-2029 Quebec Infrastructure Plan, released by the Liberal government each year in March. 🍁

Andrew Macklin is the editor of ReNew Canada magazine.

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“Putting people at the centre of the equation” is important for infrastructure development according to Francois-Philippe Champagne, which he believes was key to the Port Lands redevelopment project.

ON A MISSION

New federal infrastructure minister discusses the way forward. *By Andrew Macklin*

Prime Minister Justin Trudeau’s cabinet shuffle on July 18th brought a new face to the Infrastructure and Communities portfolio. Out was Amarjeet Sohi, shifted to Natural Resources, and in was Francois-Philippe Champagne, the former Minister of International Trade.

Champagne was first elected in 2015 when the Trudeau Government took power. He was elected in the riding of Saint-Maurice–Champlain, which represents the the City of Shawinigan, the Regional County Municipality of Upper Saint-Maurice, and Les Chenaux and Mékinac.

Just a few weeks after taking over the portfolio, I sat down with Minister Champagne during a visit to Toronto to discuss his plans leading up to the 2019 federal election.

What is your vision for the infrastructure and communities’ portfolio?

My mission is to improve the lives of Canadians. That’s why it’s a very exciting

portfolio, because whatever we do is to improve life and build the infrastructure of the 21st century. I think Canadians expect us to build infrastructure which will be modern, resilient, and green. This is where we are now. This is the vision: working with the communities, working with the provinces and territories, being there for the communities. But really, building the infrastructure of tomorrow. For infrastructure, you have to look over decades, if not, centuries. We need to do everything we have to do right, but we also can dream together and bring infrastructure in this space that people will be extremely proud of, they will feel that they own it, and that they contributed in creating it.

I was at Toronto Waterfront and this is a great example of community reclaiming being part of the discussion, the city, provincial government, and federal government being there, all three of us working together to deliver because we did one simple thing: we put people at the centre of the equation.

So when you think about infrastructure, we need to start to think first about people, because people are at the centre and you build around that.

What’s different in dealing with you versus your predecessor?

First of all, I think Minister Sohi did amazingly well. He served the nation with distinction. He came from the city, he understood cities very well.

What I intend to do is an evolution, not a revolution. It’s to work on the great work that has been accomplished by him and the team and the provinces and the territories and build on that. When you come in new to a portfolio you bring your own experience, your own vision of things. I used to be involved in project management in the private sector for a number of years so I’ve seen big projects. Also, as Trade Minister, I had the chance to promote Canada around the world so I know that modern infrastructure helps us to attract talent, attract companies, retain talent.

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Ensuring that the Canada Infrastructure Bank has a pipeline of projects to invest in will be a priority leading up to the 2019 federal election.



Credit: CP/Polina

My dream is that when people think about infrastructure in the world, they think about Canada as the place to be. And that's what we're going to be doing with the team with the infrastructure bank, building on what we have achieved, and trying to bring us further along.

dollars in a small community like where I come from can make a whole lot of difference. So it's really thinking about urban/rural, it's really thinking about all regions of Canada. It's thinking about the north as well.

We have partners in cities and provinces, and the infrastructure bank, so we're going

citizens want to live today, but also, how can we use technology, how can we urban planning, how can we use new materials to create a more enjoyable living for people.

When can we expect to hear announcements made regarding investments made through the Canada Infrastructure Bank?

These are the early days. We have big ambition. We are building the governance to deliver. But we are also looking at projects as we speak.

I have comfort that we will be able to come back to the market in a relatively short period of time with a pipeline of potential investment which we'll be looking at. *Note: Shortly after our conversation, a \$1.28-billion loan was announced for the Réseau express Métropolitain project in Montreal.*

Will the Champlain Bridge be delivered on time?

That's still the objective: to deliver on time. I had, as you may appreciate, my first visit (yesterday), so we still need to meet with experts and the construction managers on this project. But I realize also that this is a landmark for Canada in terms of infrastructure. You're talking about infrastructure that is going to be there for more than a century, serving tens of millions of Canadians.

So it's about delivering quality, delivering safely, and also delivering on time. This is the objective we have, and we'll have more to say once we have had a chance to meet with the experts. 🌱

I think Canadians expect us to build infrastructure which will be modern, resilient, and green. This is where we are now.

What are your priorities between now and next fall's federal election?

My priority number one is to make a difference in the lives of people. And certainly what we are going to be trying to do with colleagues across Canada [...] is to focus on their priorities, working with them to accelerate their priorities as much as we can with the funding of these projects to make an impact. I am all about impact. Making sure that we have impact in communities, making sure that we reduce transit time for people so they can spend more time with their family at home or in their community or building a small/medium-sized business. Making sure that we improve water quality through wastewater treatment. Making sure that we use our green infrastructure to tackle the biggest challenge of the planet. And not only build, but build smarter and greener.

I come from rural Canada (Shawinigan, Que.). And I kept saying to people 'it's not about the size of the award or the grant, it's about the size of the impact. Ten thousand

to be working collaboratively. I have talked to my counterparts in other provinces, and I want to be their best ally in delivering for the people.

What is the legacy of the Smart Cities Challenge?

It's about dreaming big. In my previous role, I was the chief marketing officer of Canada. I was out there promoting Canada.

I want all Canadians to be proud of our cities and what we have accomplished. Waterfront Toronto is a great example. It's not about just reclaiming; it's organizing an urban environment around people.

I keep saying to people: give me your best ideas, because I want to create a cluster of best practices in Canada and around the world. That's why every time I see something I say, who's doing it the best in the world? Who has the best idea in Canada? How can we replicate it? So we create more livable, green, modern communities that put the citizen around them, and that's what the Smart Cities Challenge is all about. It's about



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Video 1: Best Practices



Video 2: Words of Wisdom



Video 3: Megaprojects



The Real Dirt on Dirt: Construction groups launch video series on excess soil management

An important message in a recently released video series on excess construction soil is that there are better ways to manage it. This soil is what comes from civil infrastructure projects such as transit, roads, bridges, sewers, watermains and other utilities, and is often trucked up to 100 kilometres to dump sites.

“Clean excess soil can be reused at other projects through upfront planning,” says Andy Manahan, executive director of the Residential and Civil Construction Alliance of Ontario (RCCAO). “This three-part video series intends to increase awareness about alternatives to the ‘dig, haul long distances and dump’ approach.”

RCCAO teamed up with the Greater Toronto Sewer and Watermain Contractors Association to produce “The Real Dirt on Dirt: Solutions for Construction Soil Management” to highlight the use of best management practices (BMPs). The series focuses on Ontario’s robust construction market, which generates almost 26 million cubic metres of excess soil every year – enough dirt to fill Toronto’s Rogers Centre, home of the Blue Jays, 16 times.

Implementing BMPs will result in more cost-effective infrastructure delivery. Reducing truck traffic will not only make our roads safer but also lower greenhouse gas emissions, creating a healthier environment.

An online soil-matching service is available to help find sites for excess soil in Ontario at soil.com.

2018 ONTARIO EXCESS SOIL SYMPOSIUM

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The Canadian Urban Institute is convening the 2018 Ontario Excess Soil Symposium to share information and lessons learned about the beneficial reuse of excess soil in Ontario. Topics will include:

- Successful pilot projects and case studies
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- Advances in municipal by-laws
- Soil quality and carbon storage
- And more

Register and learn more at: canurb.org/excess-soils-symposium



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The \$3.67-billion Turcot Interchange project in Montreal, as of July 2018, is one of the most complex transportation redevelopments in North America.



All Photos: KPH Turcot

TAMING TURCOT

Minimizing construction delays at one of Canada's busiest highway interchanges. *By Eric Vaillancourt and Sylvie Gervais*

As Quebec's largest interchange, the Turcot interchange is critical to the economy and development of the city of Montreal. Connecting to the Champlain Bridge, the route provides important access to the Island of Montreal, and links the airport with the downtown core as it links three of the main highways of Montreal. More than 300,000 vehicles, 10 per cent of them heavy trucks, use the interchange daily, making it vital to the movement of people and goods in the area.

Built in 1967, and heavily used in the following decades, Turcot's infrastructure was nearing the end of its lifecycle. The Ministère des Transports de la Mobilité Durable et de l'Électrification des Transports (MTMDET) had, for several years, been investing in the planning and execution of pre-project studies and processes, as well as in the construction of preparatory structures, with an eye to carrying out a design-build project to replace the aging infrastructure with a complex of interchanges and highways

connected to the existing road network.

In February 2015, the KPH Turcot consortium, a partnership of Construction Kiewit Co, Parsons Canada Ltd., and CRH Canada, along with a strong team of industry leaders in a range of specialties, was commissioned to undertake final design and construction for this large-scale and complex project. WSP, a member of the KPH Turcot design-build team, contributed to a number of project aspects, including engineering design and traffic management during construction.

The Turcot project, which is currently the most complex road project in North America, is the site of several innovations and premieres in Quebec, in terms of design and construction.

There is no doubt that the biggest challenge of the project is to develop a new design and maintain mobility for the volume of vehicles that pass through the Turcot interchange on a daily basis. This major constraint is at the very heart of project planning and management.

Inversions of Highway 20 lanes, difference in height of structures (existing and future), proximity to the built environment, presence of active railways, limited space, and tight deadlines are also challenges with which teams must work in order to establish the sequence of work and then execute them.

In order to meet these many challenges, KPH Turcot sometimes has to resort to an out of the ordinary design or to innovative construction methods.

The solutions developed to address these challenges centered on:

- Developing a complex roadway geometry concept (145 km of lane);
- Designing innovative structures (42 bridges and overpass);
- Major soil remediation issues;
- Complexity to design a new stormwater system in an existing area;
- Developing proper phasing/work sequencing;



The project team used 3D imaging to establish the work sequence, one that would help to minimize traffic impacts through the interchange.



A temporary prefab launch bridge, shown here in December of 2017, was one of the innovative solutions used to reduce construction impacts on the 300,000 daily users of the interchange.



Temporary traffic configurations have been necessary throughout the project in order to keep vehicles moving.

- Closely coordinating the use of several temporary traffic configurations located in various sectors of the project at the same time including temporary bridges;
- Designing mechanically stabilized earth retaining walls that could be constructed more quickly than cast-in-place walls, an important consideration as there were 72,000 square meters of retaining wall—the equivalent of 13 American football fields;
- Using reinforced concrete panels anchored in soil with steel anchorage; and
- Using existing roads for traffic deviation whenever possible; for example, utilizing a newly built municipal boulevard as a temporary ramp.

Keeping things moving

As the interchange was heavily used on a daily basis, it was vital that impacts on the existing traffic flow be minimized. Always keeping mobility as a priority, construction activities have been planned and managed on a daily basis to reduce impacts on road users. The development of the work sequence

made it possible to identify the conflicts or the constraints to the realization of certain works and to refine the scenarios for the maintenance of the mobility. Addressing these barriers is a multi-disciplinary effort from both the designer's and the builder's perspectives.

To establish the work sequence, KPH Turcot and WSP first carried out modeling in three-dimensional (3D) imaging of the existing exchanger and the new interchange to build. Once the two models were juxtaposed, a real puzzle ensued. It is then possible to see the space available for carrying out the work and to find a starting point for construction off the road, while taking into account the constraints of the surrounding environment.

This model was helpful for developing proper phasing/work sequencing. The design had to be tightly coordinated, and work had to proceed in small components, built piece by piece—a bit like a giant 3D puzzle. The order of placement for the pieces was critical to maintaining the link at all times.

Whenever possible the final design was adjusted to ensure that construction could proceed while traffic continued to flow. Once

the new lanes were complete, traffic could be transitioned and the old roads demolished. Elsewhere, we needed to determine how to link old and new structures to maintain traffic at all times.

Therefore, more than 70 temporary roads were used to help maintain traffic during the several phases. This means all kind of temporary infrastructures from simple deviations in a median to two-lane temporary roads built all in light weight fill with temporary wire walls 11-metres high and temporary bridges to cross the existing railroad. The prefab launch bridge was the most challenging of these. At 90 metres for a single span, it was, at the time of installation, the longest ever in Canada. The bridge also passed over the CN railroad tracks.

3D modeling is used for many other purposes, whether to confirm the space available for traffic (clearance height, available width, etc.) or to validate the constructability of structures. These tools also help identify conflicts with underground infrastructure such as utilities. It is thus possible to detect the spatial conflicts between the existing structures and

the new ones, which makes it possible to adapt the sequence of works or the methods of construction.

Stormwater management

In addition to managing environmental impacts of the work such as dust and noise control, the project team needed to develop solutions to handle any storm water challenges which arose. Currently, all 150 hectares are drained to a combined sewer collector that transports the water to the City of Montreal's wastewater treatment plant. Due to rapid growth in the area, this collector, which has a watershed of more than 6000 hectares, is already overloaded; excessive water flow in this collector can create sewer backups in the St Lawrence River—the largest watercourse in Quebec.

WSP and the project team addressed this challenge by developing a number of solutions to minimize flow to the collector, including:

- Designing more than a dozen retention basins which were customized to serve the constraints of the various sectors, and pipe-ponding involving ponds with both temporary and permanent detention;
- Designing two intelligent pumping

stations to optimize available retention volumes. These stations are linked to weather forecast systems, water levels in the different retention ponds and water levels in the receiving collector. This makes it possible to manage the rainwater differently depending on external conditions. For example, if the collector is full, the water level in the basins is low, and the weather forecasts indicate that the rain will stop. The pumping station is then instructed to wait until the water level of the collector decreases before pumping;

- Planning of water deviation works to allow for the demolition of existing drainage works required by work phasing; and
- Using structural pipe liners rather than constructing new pipe. This solution was used when it was impossible to replace the pipe without a major impact on the water flow or the project's schedule.

Soil management and soil remediation

The Turcot Interchange is currently one of the largest site remediation projects in the Province of Quebec.

As shown by the design choice of the new Highway 20 and National Highway 136 (A-720) bridging works, the choice of work methods plays an important role in carrying out the work according to the constraints. For example, the Turcot Yard being located on an old lake, several compressible soils had to be replaced by materials that were competent for construction.

In addition, this yard is also an old railway yard, which the two major types of anthropogenic activities recorded on site yielded many types of contaminated soil which needed to be managed.

A master plan to manage all soil rehabilitation was developed to reuse on site all soils except for "red soils" for which the level of contamination was too high. About 10 per cent of contaminated soil fell into this category. The master plan is in line with the objective to have a carbon-neutral project.

This resulted in more than five million cubic meters needing to be excavated and/or reused into embankments, materials management became an important part of planning.

In order to keep track of all types of soil, specific innovative solutions were developed by the project team, the client,



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and the environmental authorities. Soil was characterized on site, and a database was developed to generate 3D soil mapping. With this tool, machinery could be connected to GPS to receive the information that they needed to identify factors such as excavation depth.

Tracking quantities and stacks of materials is done by drone. This technique greatly

challenge of locating the contaminated soil and determining to where it should be moved. In addition, 90 per cent of the dismantling material of the existing structure are also reused in the new embankment.

As a result of maximizing the use of soil already in place and reducing the import of new material, all of this contributes to

Keeping the stakeholders fully aware of what was coming, when, and for how long, with clear and frequent communications was a priority not only the client but of the KPH Turcot consortium as well.

Anticipated to reach completion in 2020, the new Turcot Interchange will ensure that the area has the transportation infrastructure required to address its development needs for the future. Moreso however, it provides the City of Montreal with sustainable and accessible urban transportation benefits with its inclusion of dedicated lanes for public transit, bike paths, and plenty of green space. ✻

The design had to be tightly coordinated, and work had to proceed in small components, built piece by piece.

accelerated the surveying process. Once the images are captured, they are processed in 3D imaging in order to release volumetrics. The readings make it possible to follow the progress of the work as well as to follow up the quantities. This is an advantageous method for calculating volumes, which is impossible to achieve with a standard photo or an orthophoto. This use is an emerging field in the construction industry.

With this innovation, we overcame the

reducing trucking and ecological stress on sources of supplies.

The progress to date, and the development and implementation of innovative solutions to address the particular challenges, is a testament to the close collaboration and communication among the members of the project team. As important, perhaps, is the communication with the public about the status of the work and the specific ways that the temporary changes would impact their use of the route.



Éric Vaillancourt is the team lead, major infrastructure projects, transportation at WSP. Sylvie Gervais is the senior project manager, traffic maintenance, transportation at WSP.



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Healthy, affordable housing infrastructure can be a solution for redevelopment of brownfield sites in urban areas.

STRATEGIC REDEVELOPMENT

Can brownfields be part of a national housing strategy?

By Marlene Coffey and Grant Walsom

On November 22, 2017, the Canadian government made a historic commitment to improve the issues of affordable housing in Canada by launching the country's first ever National Housing Strategy. This \$40 billion, 10-year plan for Canada includes new and previously committed federal investment, low-interest financing and predicted provincial cost sharing.

Given that virtually all urban areas across Canada are seeing unprecedented pressures on rental affordability, the National Housing Strategy is a long-overdue and welcomed program for the non-profit and community housing sector. It is also welcomed by municipal governments across Canada that are consistently struggling to ensure that the affordable and community housing needs are met along with the needs of other aging and often under-funded infrastructure. The affordable and community housing infrastructure within the municipal landscape can be overlooked in favour of other priorities such as water, sewer, roads, transit etc. The National Housing Strategy assists to ensure that the affordable housing infrastructure does not fall to the bottom of the list of priorities.

A major component of the National Housing Strategy is the recently launched National Housing Co-Investment Fund which will provide approximately \$13.2 billion in direct financial contributions and low-interest loans over the next decade.

This program, which will be administered through the Canadian Mortgage and Housing Corporation (CHMC), will be delivered through two streams: new construction and repair/renewal of existing affordable housing. The National Housing Co-Investment Fund is aimed at using existing assets to leverage the funding, and successful applicants will be required to secure contributions from another level of government (i.e. provincial and/or municipal) for their projects. It is important to note that this contribution does not necessarily have to be financial but could also include in-kind contributions such as

three strategic directions. Unfortunately, the recommendations have not translated in removing many of the barriers for brownfield redevelopment issue in Canada. The Canadian Brownfields Network recently commissioned a survey of Canadian brownfield practitioners that has delivered a failing grade for the progress made on the NRTEE 2003 recommendations. With this failing grade, changes need to be considered and new strategies need to be employed for the Canadian brownfield issue.

One of the Strategic Directions identified in the 2003 NRTEE Brownfield Strategy

Many of Canada's existing brownfield properties are located within urban centres and downtown cores where infrastructure networks are already established.

land, accelerated approval processes, tax rebates, or waived charges and fees.

In 2003, National Roundtable on The Environment and Economy (NRTEE) formulated a Strategy for Canadian Brownfield Redevelopment in a document entitled "Cleaning up the Past, Building the Future: A National Brownfield Redevelopment Strategy for Canada." This document presented a series of 14 recommendations for implementation within

was to apply strategic public investments to address up-front costs for Brownfield Redevelopment. The NRTEE also identified all three levels of government (federal, provincial, and municipal) as responsible in applying this strategic direction. Could the National Housing Co-Investment Fund become a catalyst for the next phase of brownfields redevelopment in Canada?

To answer that question, we need to understand the Fund's eligibility

requirements and application approval process a little better. Within the CMHC application process, one of the priorities in ranking proposed funding and financing applications is the proximity to transit, amenities, and community supports. Many of Canada's existing brownfield properties are located within urban centres and downtown cores where infrastructure networks are already established as well as transit systems, amenities, and community support features such as hospitals, community centres, and social assistance support networks. Another potentially promising feature of the CMHC application process is the inclusion of new construction and/or conversion from a non-residential use to affordable multi-residential in the list of eligible projects for funding consideration. Again, brownfield properties are typically non-residential properties that were formerly industrial uses and are now underutilized with some form of contamination from the historical uses. However, without an incentive and financial driver, these properties sit vacant and can represent problems for the community.

We can, and will, realize the benefits of the National Housing Co-Investment Fund and its intentions, hopefully to its full

potential. However, if brownfield properties can be considered within the strategy, the benefits realized will be even greater. When considering the triple-bottom line concepts of sustainability, the benefits become clear. The affordability of the housing developments more than satisfies the social aspects. The environmental aspects can be realized through the remedies employed for the contamination, reuse of land assets, and creating homes in urban centres where reduction of greenhouse gases from commuting will be realized, to name a few. The economic aspects can be realized by the access to the co-investment funds and other brownfield incentives currently in place in many municipalities.

Perhaps the municipal governments could assist in identifying potential candidate sites where not-for-profits and private affordable housing developers could apply for the co-investment financing funds and create a two-fold benefit to the community. Further, ensuring that local tax-incentives, brownfield development funds, and reduced development charges are available along with the National Housing Co-Investment Fund for the proposed affordable housing developments should assist in making some

of Canada's more challenging brownfield sites attractive. Strong municipal support for the affordable housing initiatives on brownfield sites would also go a long way in securing the co-investment funds for local solutions.

It remains to be seen whether the implementation of the National Housing Co-Investment Fund, and the National Housing Strategy more widely, will actually translate into significant affordable home construction. Strategies such as the National Housing Strategy and 2003 NRTEE Brownfield Redevelopment Strategy require commitment to partnerships, communication, flexibility, and champions at all levels of government. Further, the commitments need to be continue beyond changes in government and remain non-partisan. 🍁



Grant Walsom is a project engineer with XCG Consulting Limited. Marlene Coffey is the executive director of the Ontario Non-Profit Housing Association (ONPHA).

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Hodder Avenue Underpass
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The benefits of using
prefabrication would
not be fully realized by
merely adapting the
traditional design and
construction process.

ABC FOR P3?

Humber River Hospital
in Toronto.

Macleod Trail and 162 Avenue
Interchange in Calgary.

Accelerated Building Construction can, and has, improved P3 projects in Canada. *By Brian Hall*

Prefabrication and component construction are becoming one of the strategic methods of increasing construction speed, buildability, and profitability within the building community.

As the architecture, engineering, and construction (AEC) industry manoeuvres itself to build with less labour and shorter construction schedules, prefabrication of concrete structures has become a viable alternative to the traditional way of construction. Over the last few years, some industry players have effectively adopted the use of precast concrete components to their advantage by either combining them with other systems or using them entirely for total precast construction.

Total precast construction has enabled projects to achieve a higher level of productivity than is possible with other construction methods. By using precast

concrete components predominantly, on-site operations are considerably reduced, providing a safer working environment.

However, it is important to have a good comprehension of the difference in management from the conventional construction. The benefits of using prefabrication would not be fully realized by merely adapting the traditional way of design and construction process. The keys to successful implementation lie in the planning and understanding of the close relationships between design, construction, detailing, execution, and manufacturing of precast concrete components.

Accelerated Building Construction (ABC) requires a paradigm shift in logic regarding project planning, procurement, and execution. When a Project Manager aims to minimize numerous mobility impacts that occur in traditional onsite construction, they do so by

elevating certain critical activities into groups and to a higher schedule priority. Interestingly, ABC does this organically by incorporating modular and prefabricated construction methods, which addresses these critical groups of activities. This ABC 'shift' allows for the realization of intrinsic benefits such as:

- Lowering capital costs;
- Shortening overall timelines;
- Improving site safety and security;
- Gaining in project quality;
- Enhancing project durability;
- Offering more opportunity to engage new technologies into the project;
- Reducing long-term operational costs;
- Limiting social impact costs; and
- Limiting environmental impacts in the short and long term.

ABC is structured construction that uses innovative planning, design, materials, and construction methods, especially in the realm of universal and specific modularization. ABC delivers projects in a safe, time saving, cost-effective manner that optimizes resources in labour and material while nearly eliminating waste. ABC reduces:

- Construction interference with the public;
- Traffic impacts;
- On-site construction time;
- Material wastage on and off site;
- Site lay-down, staging, and storage areas along with this coordination;
- Weather related time delays; and
- Overall financing and borrowing costs.

Total precast ABC systems can be used as comprehensive turnkey project delivery methods, which save significant time and money over traditional, inefficient in-situ construction. ABC systems provide a streamlined approach to any project where the manufacturing of critical groups of activities saves time, saves money, improves quality, improves durability, and provides unparalleled access to burgeoning technologies that will move our buildings and structures into the 22nd century.

ABC methodologies also provide many of the much-needed improvements to the P3 Design, Build, Finance, and Maintain (DBFM) processes to deliver structures that serve the public better for a longer period of time, while also reducing the risk to the private sector partners in our vital social infrastructure network.

The ABC process begins at the inception of any project. The Project Team evaluates critical groups of activities that define the goals and risks to their project. After that evaluation, the Project Team reviews how an ABC process can enhance the project with the advice of specific industry experts. These experts help in developing the full business case for the project with ABC processes included and complete an analysis where they compare the ABC processes with traditional methods and cite the variances, and the advantages.

As soon as the Project Team selects a total precast ABC system to benefit their project, the philosophy and strategies are entrenched into the project through a Project Charter and are supported by the entire Project Team. This creates a harmony that is vital to the success of any project.

The ABC process is summarized as follows:

- Project Charter;
- Project Team;
- Business Case;
- Sub-tendering; and
- Job Order Contracting (JOC).

With the unanimous support of the Project Team through the business case and the project charter, the funding and financing arm of the project will need to be mobilized to meet the differing requirements akin to ABC processes where they are engaged, such as sub-tendering and Job Order Contracting (JOC). Overall, the funding and financing requirements will benefit from much shorter timelines.

Sub-tendering will also break up the task of procurement into smaller parts that are easier to control. This alone will help shorten the procurement process at critical junctions of the project. However, funding the project using sub-tendering may require a different formula to manage separate tendering approaches such as the incorporation of deposits.

JOC will simplify the procurement process for parts of each project through a formulaic standing offer on these common ABC modular or prefabricated elements. However, tracking and managing funding through these contract forms to each specific piece of the project can be a different type of challenge, especially in the realm of retainers and minimum required engagements.

ABC champions the use of the 'Just-In-time' supply chain to deliver the ABC products as they are needed. This is only possible because the modular elements are prefabricated in advance, and can also be installed with little regard to most weather conditions that would affect traditional and inefficient in-situ construction methods. Furthermore, smaller crews needed for these installations are easier to control and direct. Maintaining a construction schedule is much easier with ABC and the certainty of performance can generally be assured.

ABC also keeps sites cleaner, safer, and more secure without large amounts of materials being stored and open to the possibility of theft, weathering effects, or fire hazards. With fewer on-site workers the site is also much safer and more secure. Consider also that the negative impacts on the surrounding neighbourhood and community are minimized.

Prefabricated modular total precast concrete structures have been around for many years with projects such as Habitat 67 in Montreal, which showcased precast concrete modular construction techniques unheard of at the

time, the Saddledome in Calgary, and the Rogers Centre (Skydome) in Toronto. In recent years other high profile infrastructure projects include Yankee Stadium in NYC, the Brampton Civic Hospital and the Humber River Hospital in Ontario, the Provencher Bridges in Winnipeg, the Rt. Honorable Herb Gray Parkway in Windsor, Ont., the Manitoba Floodway Expansion Project in Manitoba, and the Hodder Avenue Underpass in Thunder Bay.

Incorporating total precast concrete ABC within P3 Projects creates more opportunity and decreases the risk associated with traditional in-situ construction project, when taking everything into consideration. ✦



Brian J. Hall is the managing director of the Canadian Precast/Prestressed Concrete Institute (CPCI).

WHEN PROBLEMS ARISE

While many P3 projects have been, and continue to be, delivered successfully, some projects have experienced problems, but we must recognize the importance of the circumstances of their failures—typically they occur when proper codes and certifications are not followed. This can result in serious negative consequences for the public owner and its project, end-users, and the public, as well as the private sector P3 partner and its team including the many sub-contractors—a negative outcome for the entire design and construction industry. Well-written performance requirements that clearly lay out the project scope, construction code and standards, and product certifications (such as precast plant certification by the CPCQA Certification Program) are essential parts of the early procurement process. This creates a win-win situation for both public agencies and P3 proposers; the proposers have a higher degree of flexibility to devise a broad range of viable alternatives to meet those end goals and the agency avoids inadvertently owning risks or liability that originate from any prescriptive design requirements. ✦

INTERNATIONAL INFLUENCE



Aecon's experience building megaprojects in Canada landed them in Quito, Ecuador as the contractor behind the Mariscal Sucre International Airport.

Canada's experience with P3s is helping companies secure business globally.

By Mark Romoff

Canadian companies are at the forefront of a massive public-private partnership to streamline how 84.6 million annual travellers arrive and leave LAX, the world's fifth busiest airport.

Now, instead of experiencing your own Planes, Trains & Automobiles moment in a far-flung rental car lot, LA Gateway Partners, an international consortium jointly led by Canada's Fengate and PCL, is the preferred bidder to build a centre (known as a ConRAC) to consolidate all 14 car rental brands at LAX in one location. That's space for almost 17,000 rental vehicles!

The 55-hectare site next to the 405 freeway will be accessible via the airport's brand-new, four-kilometre-long automated people mover system, a project involving another Canadian company: Bombardier.

Both projects are examples of major deals where Canadian companies have used the experience, best practices, and capacity honed from more than 25 years' experience navigating and managing P3 deals on home soil to branch out internationally.

With 280 active P3 projects, including those now operational or under construction, worth close to \$130 billion, Canada has emerged as a global P3 powerhouse with a stable pipeline of projects, access to private sector capital and continuing government interest in the

approach. P3s have built everything from schools, hospitals and highways, to sports and cultural venues, public transit systems, and even a high-speed fibre optic telecommunications network in Canada's North.

Along the way, we've created our own 'made in Canada' P3 model and embraced increasing sophistication in approaches, from simpler design-build-finance models to multi-decades-long contracts spanning design, build, finance, maintenance, and operation of the assets. The model has also encouraged private sector partnerships to

most exciting and ambitious P3 projects.

Building better and higher

High in the Andes Mountains, a dizzying 2,400 metres above sea level, Aecon used its expertise building Canadian landmarks like the CN Tower and major transportation projects like the Canada Line and Terminal 3 at Toronto Pearson International Airport to create Ecuador's brand-new international airport.

The Ontario-based company was the lead developer, investor, and contractor on the Mariscal Sucre International Airport in

Although you'd never know it, several significant infrastructure projects in the U.S. have a Canadian connection.

bloom among construction companies, legal firms, engineers, banks, and architects.

This success, as well as an ever-escalating global need for new investment and innovation in critical infrastructure—estimated at \$94 trillion by 2040 by the Global Infrastructure Hub—has placed Canadian companies in a strong position to compete—and win—some of the world's

Quito, which opened in 2013 and shares the same name as its predecessor—but that's where the similarities end.

The P3 project moved the airport to an entirely new green space, 18 kilometres away from its previous cramped location in a dense urban neighbourhood with several nearby volcanoes. The new airport is 10 times the size and boasts one of the longest

runways in Latin America, a state-of-the-art passenger terminal building and new control tower, cargo, hangar, catering, and other aviation facilities.

The transformational project has bolstered the country's economic might, radically improved safety in the air and on the ground, as well as created thousands of new jobs. It's also enabled Mariscal Sucre to shed its label as one of the world's most dangerous airports. Now, it's known as the best regional airport in South America, as ranked by the influential aviation-ranking guide Skytrax.

Aecon has since sold its stake in the Quito airport concession and is currently involved in redeveloping the L.F. Wade International Airport in Bermuda. Helping on the Bermuda project is a veritable Team Canada involving dozens of firms and agencies, as well as the Government of Canada through the Canadian Commercial Corporation.

The project, one of the largest infrastructure projects ever undertaken on the island, is using innovative infrastructure to construct a terminal that can resist hurricane-force winds, an increasingly critical feature as countries struggle to withstand the damage inflicted by pounding Atlantic storms each season.

Life is a highway and...

Closer to home, Canadian companies have also made inroads in the United States, where the American Society of Civil Engineers has warned USD\$4.6 trillion in spending is needed by 2025 to bring American infrastructure up to an acceptable standard. The pressing need for high-quality, state-of-the-art projects delivered quickly for a fixed price is why the U.S. market is considered one of the biggest potential markets in the world for P3s.

Although you'd never know it, several significant infrastructure projects in the U.S. have a Canadian connection. You may have driven on a highway, taken public transit, or visited a hospital that has a little Maple Leaf in its design.

Plenary, BTY, WSP, Hatch, and SNC-Lavalin, to name a few, have all had success down south as part of teams winning projects worth billions in states such as California, Colorado, Pennsylvania, Texas, and Washington. Along the way they've racked up an impressive number of firsts, showcasing a spirit of innovation and comfort with complexity.

For example, WSP is the lead designer to replace the Central Terminal (Terminal B) at LaGuardia Airport in New York City—one of the largest public-private partnerships in the history of the United States and the largest in U.S. aviation history. The terminal is the busiest at the Big Apple airport,

handling the majority of travellers passing through LGA each year.

Once compared to a “third world country” by former vice-president Joe Biden, the scale and scope of the project is “expected to influence many airport redevelopment projects in the future and is being closely studied by industry,” says BTY, which is providing technical advice to the lenders on the project from the pre-bid stage through construction monitoring and payment certification. The inclusion of WSP and BTY showcases the breadth of Canadian expertise that can be tapped on global P3 projects.

In California, Plenary is part of a team reimagining the civic heart of one-time surfing mecca Long Beach. The mega-project is creating a new city hall, main library and a new headquarters for the Port of Long Beach—all designed to achieve LEED Gold when they open in 2019—as well as a revitalized Lincoln Park that improves recreational options and public safety, and a vibrant mixed use real estate development.

It's the the first social infrastructure project in the United States to be financed using a taxable private placement solution and the first hybrid design-build-finance-operate-maintain deal in North America, combining both public infrastructure and

private development components within a single project, Plenary notes on its website.

Where to next?

With new projects and new jurisdictions adopting the P3 model both here in Canada and abroad, the outlook for Canadian companies in this sector looks encouraging.

More governments are recognizing how critical it is to make sustained investments in infrastructure—to build not just for today but for the future. Crumbling highways and bridges, outdated hospitals or non-existent public transit, for example, prevent our communities and countries from thriving economically and socially. Infrastructure in all its forms is the critical underpinning making future innovation possible.

Working with our Trade Commissioners, Export Development Canada and Canadian Commercial Corporation, the Canadian P3 industry is poised to expand its global infrastructure footprint and that can only mean good things for Canadians. 🍁



Plenary is part of a team that is redeveloping multiple building in the civic heart of Long Beach, California.

Credit: Plenary-Edgemoor Civic Partners



The new LaGuardia Airport Central Terminal project in New York City, one of the largest P3 projects in U.S. history, has strong Canadian representation through WSP and BTY.

Credit: LaGuardia Gateway Partners



Mark Romoff is the president and chief executive officer of the Canadian Council for Public-Private Partnerships.

Air Support

The helicopter is supporting crews by moving material and workers as they complete stringing operations on the Island Falls to Key Lake Transmission Line in Saskatchewan. Valard Construction was the prime contractor for SaskPower on this project. —Staff



Credit: Valard Construction

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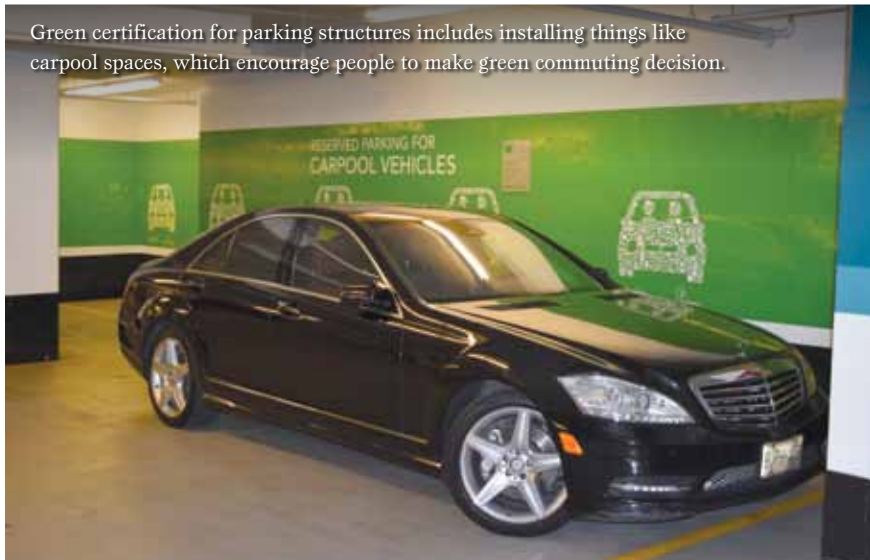
Photos: Renew Canada



Green solutions in a parking garage in downtown Toronto.



Green certification for parking structures includes installing things like carpool spaces, which encourage people to make green commuting decision.



GREEN PARKING

New certification improves the environmental quality of parking structures.

By Andrew Macklin

Green parking. To some in and around the infrastructure industry, putting those two words together could resonate as an oxymoron. But thanks to the introduction of Parksmart certification in Canada, green and parking are working hand in hand, finding solutions to help improve the quality of both built and under construction parking structures.

The origin of Parksmart dates back to 2009 with the International Parking Institute's (IPI) launch of the Green Parking Council (GPC). The GPC originally launched the initiative as the Green Garage Certification in 2014, and was the world's only green rating system for the parking industry in the world. In December of that year, a Memorandum of Understanding was signed between the IPI, GPC, and the Green Building Certification Institute (GBCI) that allowed the certification to be delivered as part of the LEED rating system. Then, in February of this year, Parksmart came north of the border as part of the joint venture between the Canada Green Building Council and GBCI (creating GBCI Canada).

Understanding Parksmart

The Parksmart certification focuses on the Big Six, six areas of focus for making green, sustainable improvements to parking structures:

1 Air

Internal and external wayfiniding, traffic flow plan, low-emitting vehicles, alternative fuel vehicles, alternative fuel fleet vehicles, idle reduction payment system, tire inflation systems, EV charging systems.

2 Water

Stormwater management, rain water harvesting, grey water reuse, indoor water efficiency, water efficient landscaping, roofing systems.

3 Energy

HVAC systems (occupied spaces), ventilation systems (parking decks), lighting controls, energy efficient lighting system, renewable energy generation, energy resiliency (storage).

4 Mobility

Car share program, ride share program, bicycle parking/sharing/rental, access to mass transit, marketing/educational program, parking pricing, TMO/TMA, third-party sustainability certification, innovative approach.

5 Green operations

Recycling program, sustainable purchasing program, proactive operations maintenance, cleaning procedures (occupied spaces), cleaning procedures (parking decks), credentialed management.

6 Green design & construction

Building systems commissioning, construction water management, regional materials, regional labour, reused/repurposed/recycled materials, fire suppression systems, no/low VOC coatings, paint or sealants, design for durability, life-cycle assessment.

Each of the six focus areas provides opportunities for green, resilient, and/or sustainable solutions that help improve the environmental quality of the structure.

“Green parking is trying to look at the ecosystem; not just the physical structure itself, but the people using the facility, and how the facility is being used now and will be used in the future,” explains Michael Giles, director of account management for Impark Canada.

ImPark was one of the founding members of the Green Parking Council, and has been actively engaged in the discussion of green parking since the Council was formed nearly 10 years ago.

Giles and his team have been actively working with its current assets across Canada, which are primarily located in major urban centres. Working with commercial and municipal clients across the country, the company has looked at ways to work together to build-in some of the green initiatives that are part of the Big Six.

Giles and I walked through a parking structure that ImPark manages for a commercial client in the heart of downtown Toronto. During the tour, he pointed out some of the initiatives that had been pulled together in the

particular structure, ones that would inherently earn points towards the new Parksmart certification:

Electric vehicle charging stations: People who make the conscious decision to buy an electric vehicle shouldn't have to go to work wondering when and where they will get their next charge from. EV stations provide the power needed and reward those who have made a green decision with their car purchase.

Tire inflators: One of the biggest culprits for causing poor vehicle gas mileage is under-inflated tires. A tire inflation station helps garage users improve their mileage and simultaneously reduce emissions.

Efficient lighting: Replacing incandescent bulbs with LED bulbs is an obvious decision, but adding sensors that automatically turn off lights when they are not needed helps to reduce energy consumption.

Carpool-only spots: Placing a handful of carpool-only spots near building entrances can encourage employees to commute to work together.

Bike lockers: Working to make parking structures greener also involves changing them from car hubs to mobility hubs. Installing a bike locker in an under-utilized part of the garage provides safe storage for those making the green choice of cycling to work.

Change rooms and showers: Cycling to work is a green choice, but also has the side effect of causing people to walk into work coated in perspiration. A change room and shower installation allows people to make a pedestrian choice to get to work but still look and feel as though they had driven in.

Internal and external wayfinding: The less time a vehicle spends idling trying to find a parking space, the less emissions that are generated by the car. It seems simple, but isn't effectively managed without an efficient system that provides information on where available spots can be found.

These were just some of the more obvious systems put in place in the garage to help provide a space that is more environmentally friendly than a typical garage. And while some of these measures do carry a significant capital investment, the noticeable improvements can increase repeat business for the client in the short-

term, as well as provide long-term savings through things like energy efficiency.

New builds vs. retrofits

Clearly the options for new builds are substantially greater than for retrofits, as solutions like HVAC systems and stormwater collections are much more affordable to implement at the design stage of the structure.

But as Giles points out, in addition to some of the points mentioned earlier, there are cost-effective solutions that can be adopted with an existing structure. For starters, making environmentally-conscious decisions towards material use can provide a significant green saving such as eco-friendly paints and solvents and recycled paper. Efficiencies in water use through changes to washing and maintenance can also be targeted as green solutions for existing structures.

Regardless of the age, design, or footprint of the structure, improvements can be made to provide a more environmentally friendly structure. Those improvements, however slight, can help reduce emissions, lower energy use, and conserve water.

And in doing so, green parking can change from a perceived oxymoron to the new reality. ♣

For more information on Parksmart certification, visit parksmart.gbci.org/certification.

Andrew Macklin is the editor of ReNew Canada magazine.

THE IMPACT OF THE BUILDING PROCESS

Parksmart certification can have a significant impact on the building process, as designers look to make decisions early in the construction process to help improve the environmental footprint of the garage. Early adopters have explored opportunities for on-site renewable energy generation, and have also explored improving the amount of green space available, including the potential for green roofs.

But there are important green improvements that can be explored during the construction process as well, such as how workers are getting to the site, how and where construction soils are being disposed, and where materials are sourced from. Even eco-friendly materials can be a deterrent to the overall environmental impact of the structure if the materials have been transported from thousands of miles away using high-emitting forms of transportation. ♣

When liability and risk is effectively built into a P3 model, it creates a greater opportunity for a successful build even when issues arise.



A MODEL FOR SUCCESS

When structured properly, P3s can deliver highly-successful infrastructure assets. *By Kevin Li*

Since its introduction to Canada in the early 1990s, the public-private partnership (P3) process has been generally competitive, as private sector investors are keen to lock down long-term contracts and make acceptable risk-adjusted returns.

A partnership can be considered good when each party honours its part of the deal or views any temporary difficulties as an acceptable cost to achieving its long-term objectives. Like a pyramid, success factors are tiered, rising from good project selection to comprehensive project documentation to vibrant execution. A success factor in a higher tier could, to some extent, mitigate small shortcomings in a lower tier, improving a project's resilience against unexpected challenges. However, such enhancement should not be relied upon for planning purposes.

Project Selection

Public-private partnerships are not a panacea. If not properly structured, a project might have a scale or a risk profile that is not ideal for, or compatible with, the P3 model. When there are substantial risks that are not fully understood or investigated prior to financial

close, a situation may arise where the public sector is uncomfortable with sustaining such risks, whereas the private sector would find it difficult to assume these risks on a date-certain, fixed-price basis. Consequently, the public sector partner could be surprised by the cost of bids that surpass its affordability threshold because of the risk premiums charged by the private sector.

P3s are not a good arena for introducing material new risks or reinventing the wheel. For example, new technologies, untested approaches and unusually stringent performance standards could all lead to risks that neither party is happy to bear. Understanding the industry's risk appetite and the user's needs is important for scoping a project to be P3 ready. Conversely, de-risking might entail de-scoping to the point that a project is no longer attractive for private sector investors given the rewards available.

A project's size can play a part in project selection. Megaprojects may face their own challenges when delivered using the P3 model. Notably, security packages for very large projects can be very expensive, and liability caps may challenge the liquidity of

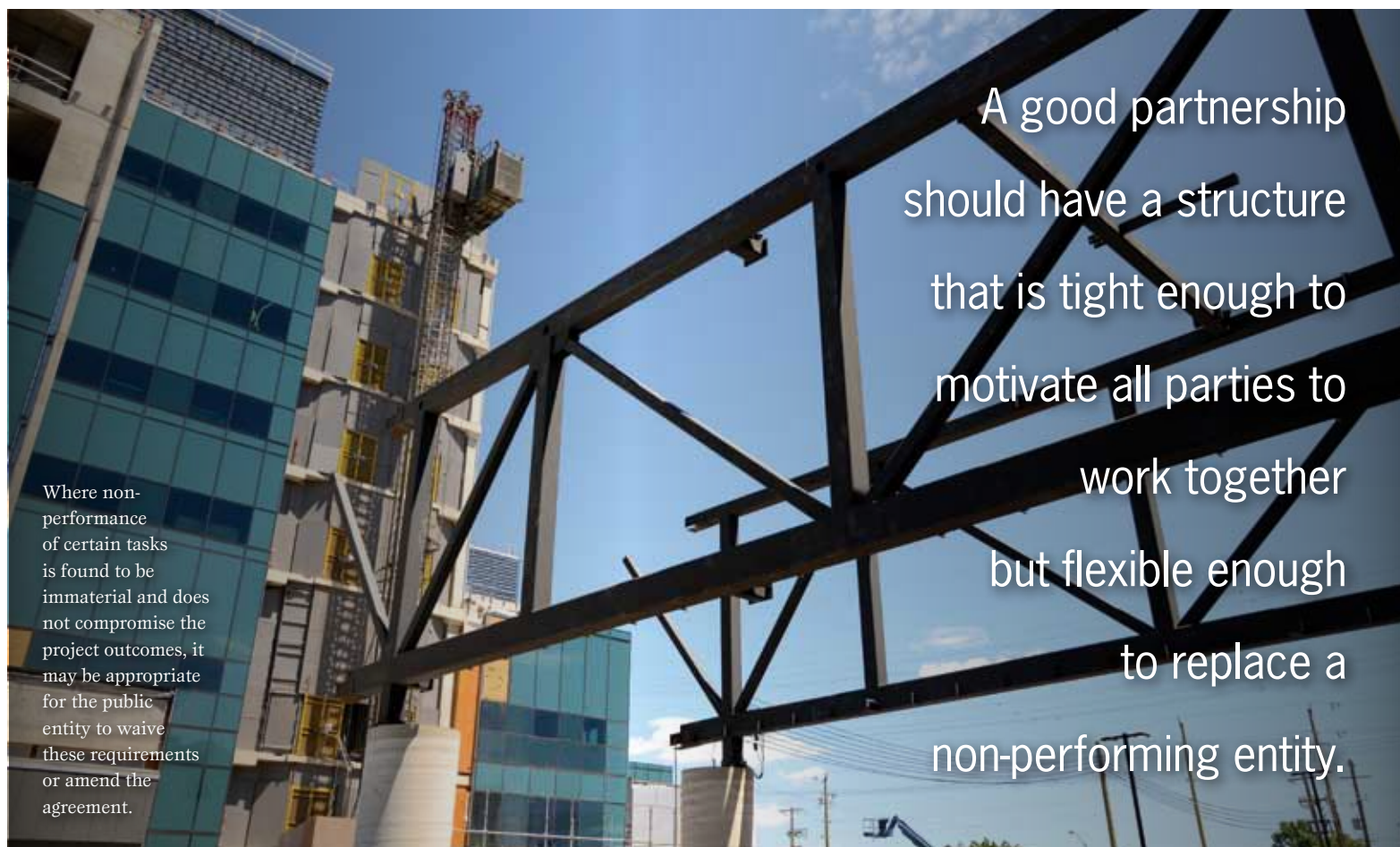
even large and financially healthy contractors.

A stable political environment and well-defined public sector objectives also play a role. Projects may suddenly become more susceptible to criticism should political tides turn. Supportive public sector involvement will help create a robust pipeline of projects and a strong framework for the P3 model.

Project Documentation

A basic tenet of P3s is that risk should be allocated to the party that is best able to manage it. Each party should be comfortable with bearing any expected major risks embedded in their assigned tasks. To that end, it is crucial to clearly define the risk profile boundaries between different project parties to preclude any misinterpretation of risk allocation or any wishful reliance on potential contract loopholes. A good partnership should have a structure that is tight enough to motivate all parties to work together but flexible enough to replace a non-performing entity so that the partnership can recover.

In a successful project, the rights and responsibilities of ProjectCo and the public sector counterparty are clearly delineated



A good partnership should have a structure that is tight enough to motivate all parties to work together but flexible enough to replace a non-performing entity.

Where non-performance of certain tasks is found to be immaterial and does not compromise the project outcomes, it may be appropriate for the public entity to waive these requirements or amend the agreement.

by the concession agreement, with no major gaps. If the public sector counterparty is managing other projects under separate contracts that interface with the PPP, these projects will be structured to protect the partnership and insulate it from any delays or monetary impact.

In a good partnership, performance standards should be clearly defined. The public sector partner typically focuses on defining outputs (i.e., the performance criteria) instead of inputs, providing flexibility for the private partner to propose innovative solutions. Overly specific inputs can also reduce a project's resilience against unexpected challenges. For example, a project that is required to use a particular design or material may not be able to tackle an unexpected geotechnical challenge in the most efficient way.

Output specifications and relevant payment mechanism are typically a combination of principles and rules. To the extent measurable, performance standards should be quantified in detail. However, the marginal benefits of adding more rules can diminish as it also increases the need for monitoring and reporting. In some cases, principles or less-descriptive rules can provide needed flexibility. For example, industry best practices or commercially reasonable efforts clauses are often seen in P3 documents, and they provide a channel for the parties to solve unexpected problems in a less rigid manner.

In a good partnership, output specifications and payment mechanism should be developed as a tool to drive desired behaviors as opposed to penalizing the party at fault. For example, in addition to setting a completion longstop date, some project agreements outline situations where the public sector partner can withhold payments if certain milestones are not achieved on time. This does not necessarily jeopardize the partnership provided that the milestone failures do not trigger a draw stop under the consortium's alternative fund sources. However, if the public sector partner is entitled to terminate the project agreement for any milestone failure, the project can become more vulnerable to what could be temporary construction difficulties.

Project Execution

The most successful partnerships have managers in place who clearly understand the contractual provisions and have a pragmatic way of thinking that encompasses the well-being of the partnership. After financial close, each party should stick to its knitting and be aware of the rules and boundaries, as failure to do so can lead to different expectations between parties, which are ripe for dispute.

In some P3s, the project agreement also allows public and private partners to revisit the output specifications in early years of operation. In addition, where non-performance of certain tasks is found to be

immaterial and does not compromise the project outcomes, it may be appropriate for the public entity to waive these requirements or amend the agreement to avoid initiating contractual penalties or default processes for minor, non-core performance issues.

True delegation is also important. In some cases, the public sector partner may be anxious to maintain a measure of control over certain tasks that have already been fully transferred to the private sector. When a public sector counterparty inserts itself into a process that has been clearly delegated, it can potentially lead to delays in solving underlying issues and a counter-productive entrenchment of bargaining positions, which makes a win-win outcome more difficult.

What has been discussed is not an exhaustive list of success factors for PPPs; rather, a reflection of some lessons learned through years of experience. By their nature, PPPs are highly detailed projects with many parties involved. As it is time consuming for all parties to understand and adapt to new risk profiles, project planners should use caution before introducing any material deviations from the existing PPP models that have proven effective and successful. ♣



Kevin Li is the senior vice president of the infrastructure finance team at DBRS Ltd.

THE COLOUR OF MONEY



In Canada, two banks had green bond issuances of \$1 billion or greater.

Green bonds: Canada's path to cleaner debt financing.

By David Stevens and Gaurav Gopinath

For the ethically-minded investor, green bonds offer a way to put private capital to work on climate projects. Green bonds also represent a strong potential source of alternative financing for environmentally friendly projects, including green infrastructure.

A 2015 report from the World Water Council noted that green bonds are “starting to become a serious asset class” for financing water infrastructure. According to a report from the Climate Bonds Initiative (CBI), just two years later global issuances of green bonds totalled about US \$156.9 billion, representing an 80 per cent increase over the previous year—a record year. More than half the issuances occurred in the U.S., China, and France and more than half of the issuers in 2017 were first-time issuers. Currently, most green bonds are “use of proceeds” bonds, meaning that proceeds raised from the debentures are restricted to clean infrastructure projects, such as wastewater management, carbon reduction, and renewable energy.

The Canadian green bond market

Canada's green bond market continues to develop and attract both domestic and international interest. However, the Canadian green bond ecosystem remains quite different from the U.S. market. Most issuances in Canada are placed by government entities rather than corporate issuers. Furthermore, green bonds in Canada tend to have shorter terms to maturity than

those issued elsewhere.

The largest issuers on green bonds in Canada in 2017 were:

- TD Bank (\$1.25 billion)
- Export Development Canada (\$1.1 billion)
- Government of Ontario (\$800 million)
- Government of Quebec (\$500 million)
- City of Ottawa (\$102 million)
- CoPower (\$20 million)

The Government of Ontario started 2018 with a bang when it issued a \$1 billion global green bond in late January. In May 2018, Manulife Financial Corporation announced

“development, construction, acquisition, installation, operation, and upgrades of projects that reduce water consumption or improve the efficiency of resources” as an eligible use. CPPIB's bonds will allow for investments in sustainable water, wastewater management, green buildings, and renewable energy. Proceeds from a \$450 million issuance by Ontario Power Generation in June 2018 have been ring-fenced for development of hydroelectric power projects in Ontario.

Investor appetite for green bonds

The steady growth in Canadian green bond issuance reflects significant investor. Past

Past offerings from the provinces of Ontario and Quebec have been oversubscribed by a factor of two to five, which is generally indicative of greater demand than supply.

that it intends to issue \$600 million in green bonds with a ten-year term. In June, Canada Pension Plan Investment Board (CPPIB) announced a \$1.5-billion, 10-year green offering, which would be the largest Canadian offering to date.

Proceeds raised from the issuances will be flowing downstream. Manulife's Green Bond Framework, for example, lists the

offerings from the provinces of Ontario and Quebec have been oversubscribed by a factor of two to five, which is generally indicative of greater demand than supply.

Interest in green bonds is driven by the fact that investors—particularly institutional investors with green mandates—are increasingly seeking exposure to climate-friendly sectors. Indeed, many investors

bemoan the fact that Canadian issuances seem to be lagging behind other jurisdictions, despite the record-breaking issuances in 2017 and 2018.

A recent report from the Investment Industry Association of Canada (IIAC) called for greater development in Canada's green bond market in order to enable alternative sources of financing for green infrastructure projects. The report noted that use of proceeds are in heavy demand, and interest is high, given mounting pressures on institutional investors to support environmental goals, such as combating climate change through carbon reduction.

The economics of green bonds

To be sure, the cost of issuing green bonds is higher than comparable non-green bonds. In order to obtain CBI's certification that a bond is of the green variety, the issuer must pay CBI a nominal fee consisting of a tenth of a basis point (or \$10 for a \$1,000,000 issuance). Additionally, the issuer must pay a CBI-approved third party to audit whether the issuer's reporting, filing, assets, and financial management structure meet CBI's requirements. The issuer may also incur internal staffing costs to implement any additional systems and protocols required to achieve certification. These are not significant costs for repeat issuers, but they may disincentivize smaller issuers.

Prospects for the future

Despite hurdles, the future of green bonds looks strong. Oversubscribed issuances are a testament to investor interest, and we can expect Canada's green bond ecosystem to grow as more private and government issuers enter the market. Institutional investors seeking to deploy capital toward green uses should look to green bonds as an asset class that offers not just guaranteed financial returns, but a positive environmental impact, as well. ♣

This article originally appeared in the September/October 2018 edition of Water Canada magazine.



David Stevens is a partner and a member of Aird & Berlis LLP's Energy Group. Gaurav Gopinath is a JD/MBA student at the University of Toronto and a summer student with Aird & Berlis LLP.

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WiRE is helping to narrow the gender gap throughout the renewable energy industry, and show students that there are opportunities to work in the sector.



PURSUIING A DREAM

WiRE helps women see a future in renewable energy. *By Allison Annesley*

Kristina Mlakar knew she wanted to work in the green economy, but didn't have a dream job in mind. That quickly changed after the University of Toronto Master's student attended a free event organized by Women in Renewable Energy (WiRE). Mlakar heard Dr. Josipa Petrunic of the Canadian Urban Transit Research and Innovation Consortium (CUTRIC) describe the organization's efforts to advance low-carbon smart mobility technologies. The Sustainability Management student was immediately intrigued.

Conveniently, Mlakar was already in the same room as the executive director and CEO. After connecting with Petrunic to express interest in working with CUTRIC, Mlakar landed an internship helping unite and expand research and testing for autonomous and connected vehicles. Mlakar made this the topic of her final Master's research paper and she has since been offered a full-time role at CUTRIC as a Junior Projects Coordinator and Researcher. Says an excited Mlakar "I would not have realized and found my dream job had I not attended that WiRE networking event."

WiRE was launched in 2013 to help nurture women and connect them to opportunity in a field where their contributions are badly needed. Participation rates for women are embarrassingly low in the energy sector at roughly 25 per cent and even lower in many sub-sectors. Research conducted by Catalyst

consistently demonstrates companies with more women in management and on their boards achieve better financial results. The research and strategy group also found teams with an equal mix of men and women outperform male-dominated teams in profits and sales.

As WiRE co-founder Rebecca Black points out: "Diversity and gender intelligence are hot topics and there's a lot of research that proves the business case for including women's voices to enhance innovation, stakeholder engagement, successful adaptation and ultimately, return on investment." Participation rates for WiRE's

renewable energy operations and related sites offer a rare opportunity to learn about some of the lesser-known aspects of the industry first-hand.

WiRE networking events feature engaging speakers who share information and experiences in an intimate setting. Participants are encouraged to ask questions they might not ask in a more intimidating environment. Not surprisingly, employers and other industry participants are keen to host WiRE events and meet the bright, capable women who want to play prominent roles in the rapidly transforming energy landscape.

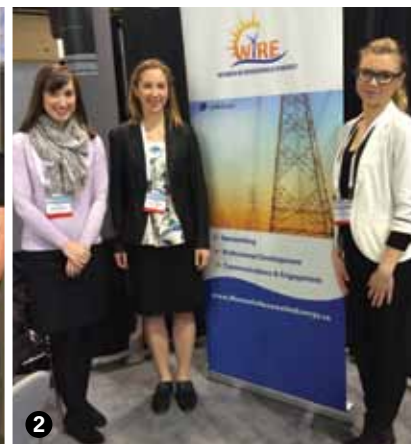
Infrastructure industry associations and post-secondary institutions leverage partnerships with organizations like WiRE to foster better connections.

Toronto-based networking and education organization have exploded over the past three years as women and employers try to close the sector's gender gap. In addition to the Greater Toronto Area group, there are now regional chapters in Montreal, Ottawa, Hamilton, Calgary, Edmonton, Vancouver, and Kamloops.

WiRE meetings, bursaries and awards are for women only. However, many smart men take advantage of the educational field trips and speed mentoring events. Tours of

Infrastructure industry associations and post-secondary institutions leverage partnerships with organizations like WiRE to foster better connections. These groups provide direct links to current and future women leaders, along with valuable opportunities to sponsor initiatives and host events, including field trips.

Recognition is another important part of what WiRE does. The organization partners with renewable energy associations,



1 Connecting with the industry includes field trips for WiRE, touring companies and operations that provides job opportunities in renewable energy.

2 WiRE actively promotes itself at renewable energy conferences across Canada to engage new members.

3 Thanks to the network she built through WiRE, U of T student Kristina Mlakar was able to find a job in the sector following the completion of her Master's degree.

academic providers and other energy networking groups to provide student bursaries and a Women of Distinction Award series for wind power, solar power and Woman of the Year.

Partnering with the federal government, Electricity Human Resources Canada (EHRC) has launched a leadership accord to promote gender diversity in the electricity and renewable energy sector. Several utilities and power workers' groups have signed on and WiRE is actively involved in supporting this initiative. Not surprisingly, the CEO of EHRC is a woman, Michelle Branigan, a past WiRE Woman of the Year honouree.

Women already in leadership positions also benefit from the opportunities professional groups like WiRE offer. WiRE Advisory Committee Member Debbie Ellis is a senior sales manager for G&W Electric with more than 25 years of experience. The switchgear Ellis' company supplies is not high profile but as a founding sponsor of WiRE, G&W has increased market awareness. This has helped Ellis land a promotion, while establishing board experience for herself and expanding her contacts. Says Ellis, "Who I know in this industry has helped build trust and enhance my reputation."

WiRE co-founder and Co-Chair Joanna Osawe, a business development manager for major projects at DMC Power, emphasizes the importance of networking. "Involvement in organizations of like-minded people with the same passion as you create

more educational and professional growth opportunities for everyone."

Ironically, co-founder Black is a marketing and communications professional whose business doesn't directly benefit from her association with WiRE. Black Current Marketing mainly consults on education and engagement strategies to support climate solutions. As a feminist and a sustainability professional, Black embraces the mission of WiRE and the group helps Black centralize her mentoring.

Many in this rapidly changing field are starting to realize the importance of gender diversity to support the shift to a low carbon economy. Says Black, "Including the voice of women is essential to successfully navigate the massive technical and social changes faced by the energy sector."

Osawe points out there is great value in the conversation, support and friendship WiRE offers participants. This is not what you would expect from a group catering to men. But this approach would likely help foster confidence and success for the members of any professional organization. The rapid growth of WiRE certainly suggests they're on to something. ♣



Allison Annesley is the vice president of energy solutions at Efficiency Capital Corp.

TIPS FOR HOW TO ENTER AND SUCCEED IN A MALE-DOMINATED INDUSTRY FROM WIRE CO-FOUNDER REBECCA BLACK

- Know your stuff: subscribe to the many online magazines, newsletters and blogs that offer free, credible information on your focused sector. Read them regularly and use the information to start conversations with other professionals and/or erstwhile mentors.
- Volunteer for industry association events to make new connections, access programming and read the market for tastemakers and influencers.
- Identify people you already know working in your sector. Ask if you can meet them for coffee and advice.
- Use LinkedIn to find other people who work for organizations you're interested in. Then see if you know someone they're connected to who can introduce you. Try to set up information meetings so you can learn more about the industry, the organization and how you may fit in.
- Once you identify a specific role, study up on the issues you would face doing that work so you can demonstrate your knowledge to potential employers and/or clients and highlight your level of engagement and value.

Join a professional networking group and take advantage of education and connection opportunities! The women who are active in these groups are likely hardwired to do what they can to help if you explain what you're seeking. ♣

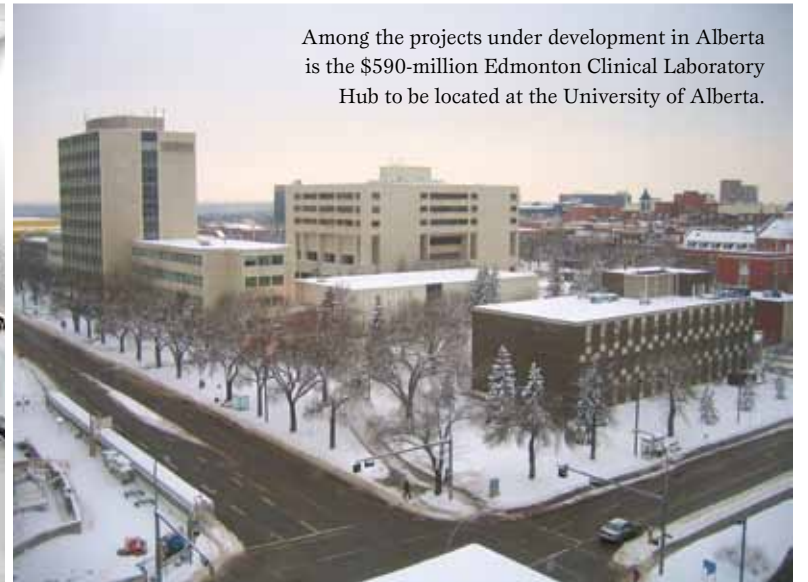
One project that will not be in the 2019 report is the \$3.5-billion replacement of the George Massey tunnel, as previous plans to procure a 10-lane bridge have been halted.

Top100
Canada's Biggest
Infrastructure Projects

For additional details on this year's
Top100 report, visit top100projects.ca



While a review of the province's finances is being undertaken, procurement of new infrastructure projects across Ontario, including multiple hospital projects, has been delayed.



Among the projects under development in Alberta is the \$590-million Edmonton Clinical Laboratory Hub to be located at the University of Alberta.

2019 TOP100 PREVIEW

The trends impacting megaproject development. *By Andrew Macklin*

With January 1st fast approaching, the 2019 edition of our annual Top100 Projects report is nearing completion. Infrastructure leaders from across Canada and around the world have provided their input, and our team is pulling it all together to provide our in-depth look at the development of public sector infrastructure megaprojects across the country.

When the process began back in March, we knew that about 80 per cent of the projects we wrote about in 2018 would

remain in 2019 as substantial completion was targeted beyond December 31st, 2018. But as the year progressed, five trends emerged that began to define how the 2019 report would take shape.

1 Ontario on hold?

When Ontario's Progressive Conservative party was elected in June, they firmly placed their finger on the pause button. A line-by-line audit of the province's finances began in the summer, with a contract awarded to EY, and the pipeline of infrastructure

projects ground to a halt.

While no megaprojects in the Infrastructure Ontario pipeline have been cancelled as of the time of this article being published, the review has slowed the procurement process. The result could be a few less Ontario-based projects being part of the 2019 report than anticipated.

2 Quebec's new leadership

Ontario is not the only province whose change in government is likely to have significant impacts on the infrastructure

pipeline, as the neighbour to the east adjusts to its new regime.

The election of the Coalition Avenir Québec in October likely caused some changes to transit priorities in the province, so long as newly-elected Premier François Legault stays true to the transportation plan his party released in June. Highlights of which include extending Montreal's Blue Line and a few key LRT lines, not moving forward with the Pink Line proposal put forward by Montreal Mayor Valerie Plante, and widening parts of Highway 30 to provide transit lanes.

3 Big plans for B.C.

The John Horgan NDP-Green coalition government in British Columbia has pushed forward with plans for new and rehabilitated transit and transportation projects, with several making significant progress in 2018. It didn't hurt that the federal government also officially announced its financial support for the Phase 2 plan put forward by TransLink.

However, there is still one megaproject left hanging: the estimated \$3.5-billion George Massey Tunnel rehabilitation or replacement. But with new leadership

stepping in throughout the Greater Vancouver Area following the October 20th municipal election, the future of that project could be cleared up in the months that follow.

4 Much ado about Alberta

There is no shortage of projects under development in Alberta. But just how many of them are far enough in the design and procurement stage is the question.

The province boasts a bevy of transit, renewable energy, transportation, and health care projects that have been discussed and, in some cases, designed, but few have reached beyond that point. But with a provincial election on the horizon in the spring, will funding commitments for some of these megaprojects be pushed through?

This will also be an issue to watch in the new year, as we should get a clearer picture of the opposition parties' infrastructure priorities, and what it will mean for the industry if elected.

5 Indigenous impact

The landmark agreement that has moved the Wataynikaneyap Transmission Project forward has provided a clear example of how

to build infrastructure megaprojects that are both good for the contractor and good for the First Nations communities they serve.

At the same time, the lack of successful negotiations with Indigenous communities has placed a hold on some megaprojects that have been under development for years.

With a model now in place, there are a few projects under development that could see enough progress in time to make an appearance in our 2019 report.

There is no shortage of discussion surrounding infrastructure megaprojects across Canada. But with newly-elected governments, failed negotiations, and lacking funding commitments blocking progress, there are many megaprojects that could have progressed in procurement but failed to do so.

What are the megaprojects that really are moving forward? Watch for the 2019 Top100 Projects report in the January/February edition of ReNew Canada, available the first week of January in 2019. 🍁

Andrew Macklin is the editor of ReNew Canada magazine and the author of the 2019 Top100 Projects report.

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RIVER & SHORELINE ASSESSMENT
Grand River, Kitchener, Ont.

Used motor oil entered a storm sewer catch basin that discharged into and impacted the Grand River. XCG was contracted by a towing service company to continue river and shoreline assessment work started by the City of Kitchener. Following the completion of the remediation work, XCG oversaw the restoration of the site to project completion leaving the area restored to grow back to its natural state before the spill.

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Top100
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2018 Top100 Projects Rank: 68
Value: \$700 million

North Shore Wastewater Treatment Plant construction begins

Federal and municipal officials gathered in North Vancouver to celebrate the start of construction of the \$700-million North Shore Wastewater Treatment Plant (NSWWTP).

The plant is a new facility that will replace the existing primary Lions Gate Wastewater Treatment Plant, which is more than 50 years old. The land under the existing wastewater plant will be decommissioned and the lands returned to the Squamish Nation.

The project is being undertaken by ADAPT Consortium, who was the successful proponent in April 2017. The consortium consists of ACCIONA Construction, DIALOG Design, Amec Foster Wheeler (now Wood), and TetraTech.

The contract includes the design, build, and construction financing for the NSWWTP, which will have a state-of-the-art secondary

treatment and energy recovery facilities. Upon completion, key features will include:

- The capability of treating 102 million litres/day under normal conditions and up to 320 million litres/day when storm water enters the sewer system in wet weather;
- The design of the plant will incorporate energy efficiency and recovery solutions water conservation and reuse, on-site storm water management, and measures to minimize waste generation;
- The biogas generated from the treatment of the wastewater will be used to generate electricity to run the plant and heat the facility;
- The heat recovery facility is projected to reduce greenhouse gas emissions by 7,200 tonnes per year;

- Rigorous heating, ventilation and odour control system that will capture air from the processes inside the building and clean it prior to releasing it into the atmosphere making odour virtually undetectable;
- Integration of interpretive elements, flexible community spaces and amenities; and
- Integrated resource recovery using sustainable principles.

The project has received \$212.3 million in funding from the Government of Canada and \$193 million from the Province of British Columbia.

The NSWWTP is scheduled to be operations by the end of 2020. ✨

Credit: Nalcor Energy



2018 Top100 Projects Rank: 3
Value: \$12.7 billion

PUB to examine options to mitigate Muskrat Falls

Dwight Ball, Premier of Newfoundland and Labrador, has released the terms of reference for the Board of Commissioners of Public Utilities (PUB) to examine options to mitigate Muskrat Falls. This is the latest of a series of actions undertaken by the Liberal government to mitigate the impact of Muskrat Falls on Newfoundlanders and Labradorians.

The reference questions announced by Premier Ball focus on:

- Options to reduce impacts of Muskrat Falls, including both cost savings and revenue opportunities involving the electricity-related activities of Nalcor Energy and its subsidiaries;
- The domestic need for Muskrat Falls power versus export availability; and
- Quantifying the impact of the identified options.

The PUB will be asked to deliver an interim report by February 15, 2019 and a final report by January 31, 2020. The minister will release the reports publicly and commits to using this information

to inform the final approach to mitigating Muskrat Falls.

To support this independent analysis, the Provincial Government is recommending that the PUB engage the Consumer Advocate for Newfoundland and Labrador.

The cost of the Muskrat Falls project has risen consistently over the duration of its construction. It is now estimated to cost \$12.7 billion according to Nalcor Energy CEO Stan Marshall. The original approved cost for the project was \$7.4 billion. ✨

Credit: Enhance Energy



2018 Top100 Projects Rank: 46
Value: \$1.2 billion

Partnership agreement signed for Alberta Carbon Trunk Line

Enhance Energy Inc. and Wolf Carbon Solutions Inc., an affiliate of Wolf Midstream, have announced that the two parties have entered into a project development and coordination agreement related to the construction and operation of the Alberta Carbon Trunk Line (ACTL). The ACTL is a 240-kilometre pipeline that will collect carbon dioxide from industrial emitters in and around Alberta's Industrial Heartland and transport it to aging reservoirs throughout central and southern Alberta for secure storage and enhanced oil recovery (EOR) projects.

Subject to closing under this agreement, Wolf will construct, own, and operate the CO₂ capture and pipeline transportation assets. Enhance will continue to be the

owner and operator of the CO₂ utilization and sequestration portion of the ACTL project through its EOR operations. Upon closing of this agreement, anticipated to be within 60 days, the parties will enter into a long-term service agreement and construction activities related to the ACTL project will commence. Initial CO₂ flow rates are expected to start at 800 tonnes per day in the fourth quarter of 2019 and increase to 4,400 tonnes per day by the end of 2019.

CO₂ will be supplied to the ACTL project by the Sturgeon Refinery to the Redwater Fertilizer facility and delivered to Enhance's EOR project in Clive, Alberta. Initially, Wolf will provide midstream services only to Enhance, with other suppliers and users of

CO₂ having future access to Wolf's capture, compression, and transportation services.

The construction of ACTL will be funded by Wolf in part through investments made by Canada Pension Plan Investment Board of up to \$305 million. Additional public funding for the ACTL project of \$63 million has been provided by the Government of Canada under the Federal EcoETI Program and the Federal Clean Energy Fund Program, and \$223 million in construction funding has been approved under the Province of Alberta's Carbon Capture and Storage Funding Act (2009). Enhance also expects to invest over \$1 billion in capital costs related to CO₂ storage and EOR development over the life of the ACTL. ♣

Credit: WDBA



2018 Top100 Projects Rank: 21
Value: \$2.14 billion

Gordie Howe International Bridge reaches financial close

The Windsor-Detroit Bridge Authority (WDBA) announced that they have signed a fixed priced contract with Bridging North America to design, build, finance, operate, and maintain the Gordie Howe International Bridge project. The announcement also signifies that all contractual steps have been completed and construction can begin.

The fixed-priced contract is valued at \$5.7 billion (nominal value), which includes the design build (DB) phase and the operation, maintenance, rehabilitation (OMR) phase. Bridging North America will receive progress payments during construction and a substantial completion payment at the end of construction.

They will also receive monthly payments for operations and maintenance over the 30-year concession (operating) period. The performance-based contract with Bridging North America is structured to ensure that the contractor has the appropriate incentives to meet or exceed the long-term objectives of safety, reliability, and capacity WDBA has set for the project.

The Gordie Howe International Bridge project includes the construction of:

- A six-lane, cable-stayed design bridge of 853 metres and a total length of approximately 2.5 kilometres;
- Canadian and U.S. ports of entry including approach bridges, border inspection plazas and tolling operations on the Canadian side; and

- A Michigan interchange connecting Interstate 75 to the U.S. port of entry.

Bridging North America has been meeting with local companies, organizations, and unions to discuss opportunities for partnerships. Representatives have also met with educational institutions to help develop the next generation of skilled trade workers. They anticipate the creation of 2,500 direct, on-site jobs including direct hires, sub-contractors, and seconded individuals as well as significant economic benefits that extend to the whole region.

Bridging North America has presented a 74-month construction schedule to complete the four components of the project with the bridge expected to be in service by the end of 2024. ♣

Credit: Alberta Infrastructure



2018 Top100 Projects Rank: 74
Value: \$647.5 million

Alberta seeks new contractor for Grande Prairie Regional Hospital

Alberta Infrastructure has issued an invitational Request for Proposals (RFP) for a new project construction manager. Alberta Infrastructure has terminated the services of Graham Construction for the Grande Prairie Regional Hospital project. The new construction manager is expected to be hired by late October 2018.

“This was not a decision that was made easily. I have been clear that this project is a government priority and that’s why we are taking action to construct this hospital as quickly as possible,” said Sandra Jensen, Minister of Infrastructure. “The actions taken today will provide greater certainty around the completion of the new hospital.”

A Notice of Default was issued to Graham in late July, with Jansen stating at the time that: “We have worked closely with the construction manager to resolve the issues but the bottom line is simply that the hospital is not progressing as it should.”

In response to the Notice, Graham filed its own public statement, stating that: “The owner’s recent release of a notice alleging default is unfortunately rife with errors and misstatements, and while Graham has and will continue to meet its contractual obligations while it works under the dispute resolution process, the notification necessitates a response.”

Following the termination of the its contract by Alberta Infrastructure,

Graham released a second statement, this time stating that: “Graham was hired as the cost-reimbursable construction manager of the Grande Prairie Regional Hospital and was confronted with a number of significant issues including multiple design delays on an underfunded project. Alberta Infrastructure made it clear it was not prepared to stand by its obligations under its contract with Graham Construction. Graham, an Alberta-based employee owned company of over 1500 people, is confident in its forthcoming fact-based claim for damages arising from the Government of Alberta’s actions.”

As a result of this action, construction activity on the site will be temporarily suspended until the new construction manager is hired and on site. Construction activity is expected to resume as soon as possible after that.

A new construction schedule will be available after a new construction manager is in place. However, the Ministry hopes to have a new construction manager in place by late October and have construction activities resume by late November of 2018.



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RESIGNED



Glen Carlin

Glen Carlin has resigned as chief executive officer of Jacques Cartier and Champlain Bridges Incorporated (JCCBI).

The JCCBI is the Crown corporation responsible for the operation and maintenance of multiple federally-owned structures in the Montreal region.

Carlin had been the head of JCCBI since 1996. He joined the corporation in 1989, holding a variety of other positions before his appointment as CEO.

“I would like to thank Mr. Carlin for his remarkable work as CEO of JCCBI, where he oversaw complex operations to strengthen the structure of the Champlain Bridge, and to replace the decks of the Jacques Cartier Bridge and the federal portion of the Honoré Mercier Bridge,” said Minister of Infrastructure and Communities **Francois-Philippe Champagne**.

APPOINTED



Steve Blayney

The Canadian Public Works Association (CPWA) board of directors has elected **Steven Blayney** to serve as CPWA President for a term of one year that began in August.

Blayney was an estimator and project manager with Maple Leaf Construction for 35 years before retiring in 2012. He managed construction projects in Manitoba, Ontario, and Saskatchewan, including Piney Pinecreek Airport built in 1994, the only paved airstrip that crosses the U.S.-Canada border, which received the Minnesota Airport of the Year Award.

Blayney has served on the APWA/CPWA Manitoba Chapter board of directors for over 12 years and as the chapter’s president in 2011 and 2014. He represented the Manitoba Chapter on APWA’s Council of Chapters from 2015-2017.

Blayney replaces **Andrew Stevenson** as CPWA president. Stevenson, manager of ATAP Infrastructure Management Ltd., will continue to serve on the CPWA board as past president. The CPWA board of directors has also elected **Chris Hamel**, president of GM Blueplan Engineering, to succeed Blayney as president in September 2019.



Jeremy Carkner

Jeremy Carkner has been appointed chair of the Consulting Engineers of Ontario’s board of directors.

Carkner is a principal and senior building science & sustainability specialist at Morrison Hershfield with over 15 years of experience in the consulting engineering field. He is the company’s P3 practice lead for Vertical Infrastructure in Canada and is the director of business development for the Mechanical/Electrical, Code/Life Safety and Sustainability Business Unit.

Carkner takes over from **Rex Meadley**, president and chief engineer at C.C. Tatham and Associates Ltd., who now steps into the role of past chair on the CEO board.



Doug Buchanan

Norton Rose Fulbright has announced that **Douglas B. Buchanan** has joined its New York and Vancouver offices as co-head of the firm’s North American infrastructure group.

In his new role, Buchanan will serve as senior counsel and work with infrastructure co-heads **Doug Fried** in the U.S. and **Greg Lewis** in Canada to continue to grow that practice for the firm in North America, with a particular focus on public-private partnerships (P3s).

Prior to joining Norton Rose Fulbright, he was the co-head of the global infrastructure and project finance group at an international law firm based in New York City.

Buchanan received a Bachelor of Laws degree (1984) and Bachelor of Commerce degree (1976) from the University of British Columbia. He is licensed to practice law in British Columbia and Ontario as well as a legal consultant in the State of New York. He was appointed Queen’s Counsel in British Columbia in 2007.



Michael Lindsay

Ontario Minister of Transportation **John Yakabuski** has announced the appointment of **Michael Lindsay** as special advisor on the upload of the Toronto subway system.

He will work with the province on a plan to efficiently and effectively deliver on this key commitment. Lindsay, and an advisory panel of up to three experts to be appointed, will support the government in determining the best approach

for the upload, including the building and maintenance of new and existing subway lines.

Prior to his appointment, Lindsay worked as the global director of infrastructure planning & advisory at Hatch and as senior vice president of commercial projects at Infrastructure Ontario, responsible for structuring public transit projects and modernizing public assets in partnership with the private sector.



Marco Mendicino

Prime Minister **Justin Trudeau** announced changes to the Liberal government’s parliamentary secretaries.

The changes include a new face for the infrastructure portfolio. **Marco Mendicino**, who had previously held the role of Parliamentary Secretary to the Minister of Justice and the Attorney General of Canada, now takes over the same role for Minister of Infrastructure and Communities **Francois-Philippe Champagne**. **Marc Miller**, who had previously held the role, takes over as the new Parliamentary Secretary to the Minister of Crown-Indigenous Relations.

Mendicino is in his first term in office, having captured the riding of Eglinton-Lawrence during the 2015 federal election. He defeated then-Finance Minister **Joe Oliver** and former Saskatchewan Finance Minister **Andrew Thomson** to capture the seat.

Mendicino has a degree in political science from Carleton University as well as a law degree from the University of Windsor. He is a former federal crown attorney who has also served as the president of the Association of Justice Counsel.



Brent Gilmour

The Canada Green Building Council (CaGBC) announced the appointment of **Brent Gilmour** as CaGBC’s chief commercial officer (CCO).

As CCO, Gilmour will be responsible for executing the strategic priorities of CaGBC, focusing to advance business opportunities, and running day-to-day critical business functions. He will be situated in CaGBC’s Ottawa office. **Thomas Mueller** will remain as president and CEO for CaGBC and GBCI Canada leading both organizations from the Vancouver office.

Gilmour has more than fifteen years of leadership experience, most recently as CEO of Quality Urban Energy Systems of Tomorrow (QUEST), a national voice for the Smart Energy communities’ marketplace. In this role, Brent was instrumental in leading QUEST



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from a concept to an established non-profit organization and was responsible for overall corporate strategy, operational direction, and public and government engagement.



Scott Beckman

The PCL family of companies has announced the hiring of **Scott Beckman** as its new director of sustainability.

Based in Denver, Beckman will lead the company's sustainability efforts across North America. He has more than 16 years of relevant sustainability experience, and prior to joining PCL, served as the senior project manager for an energy company in Colorado and corporate director of sustainability at a large engineering firm in North America.

Beckman graduated from Colorado State University with a bachelor of science degree in business administration and earned a master's in environmental management from the University of Denver.



Anne-Raphaëlle Audouin

The Board of Directors of the Canadian Hydropower Association (CHA) has announced the appointment of **Anne-Raphaëlle Audouin** as president.

In addition to serving

as the CHA director of government and public affairs since 2014, Audouin brings significant strategic planning and communications experience to the role.

She also holds a bachelor's degree in political science from the Université de Nantes in France, degrees in common law (LLB) and civil law (LLL) from the University of Ottawa, and a master's degree in natural resources management from Dalhousie University.



Lori Carr

Saskatchewan Premier **Scott Moe** announced changes to his cabinet including a new Minister of Highways and Infrastructure. The announcement comes following the resignation of

Lyle Stewart from cabinet for health reasons.

Lori Carr has become Minister of Highways and Infrastructure. Carr previously served as Legislative Secretary to the Minister of Finance and Government Deputy Whip. Carr was elected as the Member of the Legislative Assembly (MLA) for Estevan in the 2016 provincial election.

David Marit, who previously served as the Minister of Highways and Infrastructure, becomes the new Minister of Agriculture.



Ted Gruetzner

Global Public Affairs announced the repositioning of its Energy, Environment and Resources practice under the leadership of **Ted Gruetzner**, who will serve as vice president of the practice, and as national practice group leader.

Gruetzner joins Global after a lengthy career at Ontario Power Generation (OPG). As vice president, he was responsible for OPG's extensive public affairs and external relations team and managed all government relations, communications, and indigenous and stakeholder engagement services on behalf of the organization.

At OPG he developed a new strategic approach for all engagement with municipalities, provincial, federal, and U.S. government issues and also industry and related indigenous, stakeholders, environmental regulators amongst other critical relationships for the organization.

This new national practice will focus on public affairs services for the broad energy sector fully leveraging Global's expertise in government relations, strategic communications, and stakeholder engagement in markets across Canada.



Many of the delegates gather on the grand staircase of the Terminal City Club for a group photo. ReNew Canada Publisher Todd Latham is at top right with hand on railing.



Detailed results from an executive survey were shared with delegates in an opening address by F&M Management's Faramarz Bogzaran.



Delegates of the CE3C enjoyed a casual networking dinner while aboard a Vancouver Harbour cruise.

CANADIAN ENVIRONMENTAL & ENGINEERING EXECUTIVES CONFERENCE VANCOUVER, B.C.

The inaugural Canadian Environmental & Engineering Executives Conference was held from September 19-21 in Vancouver, B.C. Launched by F&M Management Ltd., the event was created as an invitation-only platform where senior corporate executives in the environment consulting industry can meet and discuss the key issues facing their businesses in Canada.

Over 60 executives from small, medium, and global engineering and science

companies travelled from across Canada to join in detailed conversations and panel discussions on such topics as employee engagement, risk management, mergers and acquisitions, technology adoption, and the commoditization of services. Impressive keynote talks were also on the agenda; including **Eric Termuende** on the future of work, Dr. **Andrew Gemino** discussing digital innovation and pollster **Nik Nanos** who delivered a candid, informative take

on the age of voter rage and its impacts on political stability in Canada, U.S., and around the world.

There was a lot of information shared with delegates and some data may form the basis of an industry benchmarking study as part the 2019 event, which will likely be held again in Vancouver next September. For more details about the inaugural event, as well as the upcoming 2019 event, visit ce3c.ca.

Photos: Renew Canada



Former Manitoba Infrastructure ADM Douglas McMahon.



Lealy Dedman with outgoing CPWA president Andrew Stevenson.



APWA president David Lawry (left) with CPWA president Steven Blayney.

PUBLIC WORKS EXPO KANSAS CITY, MO

The 2018 Public Works Expo, hosted by the American Public Works Association (APWA), welcomed close to 6,000 attendees to the Kansas City Convention Center in Kansas City, Missouri.

This year's event featured over 130 education sessions, discussing the most important issues impacting the delivery of public works in the U.S., Canada, and abroad. It was also an opportunity to learn about the newest innovations and technologies available to public works professionals, with over 370 companies spread across almost 80,000 sq. ft. of exhibitor space.

The Canadian Public Works Association (CPWA) continued to play an important role in the four-day event, presenting workshops on the Canadian market and

providing opportunities for exhibitors and attendees to take part in its annual luncheon.

This year's CPWA luncheon included a keynote presentation from **Doug McMahon**, the former assistant deputy minister of infrastructure in Manitoba. McMahon's remarks focused on two significant influences impacting the development and rehabilitation of municipal assets, technology and climate change. He noted that projected temperature increases resulting from climate change will create real challenges for the public works sector in Canada, as changing temperatures and increasingly-severe weather systems wreak havoc on precipitation models and freeze-thaw cycles. McMahon concluded that, by being

future ready through resilient infrastructure, a resilient workforce, and a resilient organization, many of the challenges ahead can be managed or overcome.

The event also featured the announcement of the winners of the annual National Public Works Week awards. The 2018 winners were:

- First time nominee: County of Leduc, Alta.
- Less than 10,000: Town of Redwater, Alta.
- Less than 30,000: District of Squamish, B.C.
- Less than 100,000: City of Nanaimo, B.C.
- More than 100,000: City of Surrey, B.C.

For more information about the Canadian Public Works Association, visit cpwa.net. The 2019 APWA Public Works Expo will be held September 8-11 in Seattle, Washington. For more information, visit pwx.apwa.net.

Photos: Renew Canada



Panelists discuss the state of city data.



Former chief planner for the City of Toronto Jennifer Keesmaat.



Kitchener's Cory Bluhm discusses how companies can work with cities to implement data-collection technologies.

CITY AGE TORONTO, ONT.

In a discussion on data-driven city building, representatives from EllisDon, Oxford Properties, and First Gulf talked about how data is helping to inform decisions on building and rehabilitating infrastructure to be more resilient. An example used by Oxford Properties vice-president of asset management, **Scott Silverberg**, talking about the inclusion of battery power to create energy resilient infrastructure. He discussed how batteries could be a smart use of ancillary space in a parking structure or commercial space, so long as there is data to understand how the area could be impacted in the event of a severe storm. Placing battery backup in a location

susceptible to flooding for example.

Nadia Yen, director of green development at First Gulf, discussed how data collection could also have immediate positive impacts on communities. She discussed the use of lighting for data collection. Traditionally, these systems can be used for collecting data on traffic levels, but can also be used to detect storms, as well as peaks in noise levels, informing emergency services of noises like screams, calls for help, and explosions.

But it can be difficult to get municipal buy-in for these new technologies, as was discussed in a panel focused on working with cities to implement new tech. As stated by City of Kitchener executive director for

economic development **Cory Bluhm**, part of the issue is the business sector's lack of appreciation of the legislative framework that municipal business must work within. Even after successful pilot projects with a new technology have taken place, the municipality can't offer a sole-source contract if other companies are working in the same space. Tenders must be released allowing for fair competition for the municipality's business. This can be a source of frustration for startup businesses and entrepreneurs, but it is a part of the government landscape that must be appreciated.

For more information on CityAge Toronto: The Data Effect, visit cityage.org.

IN NEED OF CLARITY



Setting a standard dialogue to ensure renewable targets are met. *By Bill Eggertson*

The challenge of renewing Canada's infrastructure must go beyond doing the job right, to doing the right job.

Most leaders in the public and private sectors accept their obligation to help save our planet from the unnecessary consumption of dirty resources, but barriers towards this goal are exacerbated by the accidental and deliberate confusion that is growing around the potential for renewable energy.

Municipalities which vote to achieve '100 per cent renewable' rarely quantify their starting point, and often include only electricity due to the expectation that wind and solar will replace coal. While the capacity of emerging renewables is mushrooming in percentage terms, output from nuclear reactors and gas-fired power plants also continues to grow, and the latter fuel emits almost half the carbon per kilowatt-hour (kWh) of output that came from burning coal.

Statistics Canada says six per cent of Canada's electricity comes from emerging renewables (excluding large dams, which remain the largest source despite recent reversals), but electric power constitutes only one-fifth of total energy consumption. That means a very large amount of non-renewable high-carbon fuels are burned in industry, agriculture, and heating applications, while

the rising market for electric vehicles will increase demand for that fuel.

Politicians want to limit temperature rise to two degrees celsius, but give no explanation of how to achieve that goal. I recently told a Commons committee that the average household in Canada consumes more than 30,000 kWh-equivalent of energy each year, and that space heating and water heating is responsible for the emission of six pounds of carbon for every square foot of floorspace (I used imperial measures to ensure that the implication was clear).

Traditional cars currently run on a blend of 10 per cent ethanol, but service stations do not label pumps as "renewable gasoline", nor is the term "renewable coal" used when a facility co-fires with biomass. Yet, add five per cent biomethane to a pipeline, and "renewable natural gas" is marketed as a wonder fuel.

I have worked in the renewable energy sector for 30 years, and I worry that too many people are missing the big picture. Confusion over the amorphous meanings of 'green' and 'clean' and 'sustainable' and even 'renewable' energy, as well as some deliberate greenwashing, introduces the risk that we will not have factual information with which to make choices

in the energy and environmental aspects of renewing our infrastructure.

A number of solutions are needed if we are to clearly understand the huge potential of transitioning to emerging renewables, as well as the limitations to these technologies, so we can agree on methods to overcome the barriers. We could start with standardizing energy measures into kWh-e instead of PJs, BTUs, barrels, and litres. All terms are inherently inaccurate, but more people are literate with the former than with any of the latter measures, and consumer comfort and comprehension are critical if we are to correctly decide how to convert the other 94 per cent of our electricity and the other 99 per cent of our energy, to ensure that it is as "renewable" as possible.

Industry does a good job of building and renewing our infrastructure; now we must "up our game" to ensure we are as ambitious and as realistic as possible in our pursuit of a better environment. ♣



Bill Eggertson manages the International Ground Source Heat Pump Association and the Canadian Association for Renewable Energies.



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