

MESSAGE FROM THE BCG CENTRE FOR CANADA'S FUTURE

Thank you for joining the CanInfra Summit and Ideas Contest Finale. We all share the belief that infrastructure is vital to Canada's economic and social prosperity. We are confident that the contest helped amplify the national dialogue on infrastructure priorities and generated innovative ideas for transformational infrastructure in Canada

Since our launch summit in October, we have been inspired by the ambitious teams and their ideas for the CanInfra contest. We are delighted to share a summary of the conference with you

We are grateful for the range of expert perspectives shared by thought leaders and panelists from the infrastructure sector. In particular, we would like to thank Prime Minister Justin Trudeau, Minister of Finance Bill Morneau, and Mayor John Tory for participating in our conversation. Thank you also to our partners Brookfield, Deloitte, CIBC, RBC, Torys LLP, and media partner *The Globe and Mail*, who all contributed intellectual leadership and financial resources to make this event possible

We hope you will continue to help foster infrastructure transformation in Canada.

Josephan Bea Kilian Berz

Senior Partner and Managing Director The Boston Consulting Group

Chair, BCG Centre for Canada's Future

Keith Halliday

Director, BCG Centre for Canada's Future



THE CANINFRA IDEAS

A profile of CanInfra's 73 contestants

- TOP 3 TEAMS
- OTHER TOP 10 TEAMS
- PEOPLE'S CHOICE WINNER
- OTHER TEAMS



~

CanConnect

Scaling a digital connectivity 5G platform across Canada



Electric Airship Transportation System

Scaling a cargo airship transport system for the Canadian north



Redefining the Waste and Water Utility Model

Transforming waste water treatment plants (WWTPs) to process food waste and reduce greenhouse gases (GHGs)



Taking the High Road

Developing road lanes with ability to wirelessly charge electrical vehicles (EVs) and reduce range anxiety



Inzem Energy

Carbon-free energy from recycling Canada's nuclear fuel waste



Canadian Advanced Hydrologic Network

Building a network for 30k water monitoring sensors to track and analyze water data



Indigenous Infrastructure Investment Trust (3IT)

Developing a framework for financing infrastructure in indigenous communities



These are great ideas. We should already be working on a bunch of them, and it's great that these teams have put them on the national agenda

KEITH HALLIDAY

DIRECTOR OF THE BCG CENTRE FOR CANADA'S FUTURE, IN THE GLOBE AND MAIL



IceGrid

De-carbonizing the energy grids of Nunavut communities



Smart Roads

Upgrading Canada's data road infrastructure



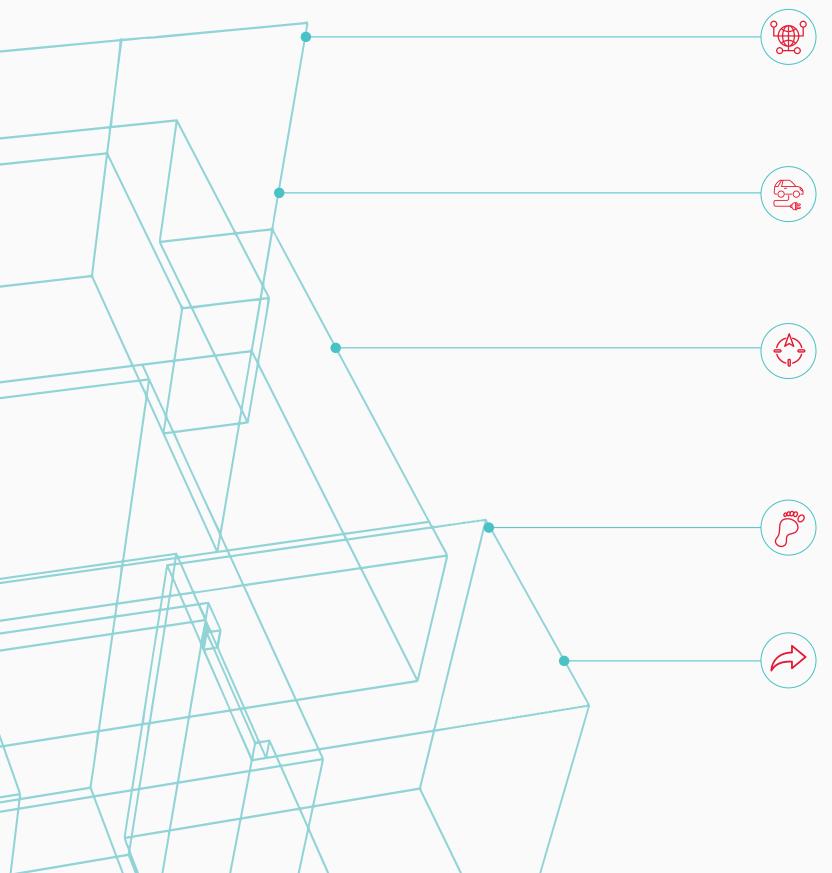
Canada 2.0 Project

Developing a blockchain enabled platform for citizens to share data with government



THE CANINFRA IDEAS

Emerging themes



Preparing for a digital future

Data or bytes are not often thought of as infrastructure, but nearly half of the Top-20 submissions had a significant digital or data component. As in other major industries, It is clear that digital solutions will have a profound impact on how we define infrastructure moving forward

Being at the forefront of a new age in transport

Six of the Top-20 proposals touched on the electrification of human and/or cargo transport. Many focused on the infrastructure Canada should aspire toward in a world where electric vehicles (EVs) will make up a significantly higher share of road users

Remembering the North

Despite the fact the North currently makes up only a small portion of our population, seven of the Top-20 entries focused on ways to transform northern economies and quality of life and/or enable new population and economic centres. This raises some interesting questions about what truly qualifies a project as "transformational" (that is, scale vs. isolated impact)

Decarbonizing and meeting our Paris commitment

More than half of the Top 20 proposals had a component that addressed greenhouse gas emissions. It's clear that Canadians view infrastructure as playing a critical enablement role in this challenge

Keeping up with ahead-of-the-curve peers

A number of ideas were focused on bringing in the best of existing technologies that are being tested (or have been successful) in other jurisdictions. These ideas cited concepts such as the hyperloop and geothermal and biomass technologies

TOP-10 LIVE PITCH SESSION

Delivering bold new ideas for Canada

The first day of the CanInfra Summit was highlighted by the Top-10 live-pitch session.

The Top-10 finalists from all across Canada had a chance to pitch their infrastructure ideas to a panel of esteemed judges from the private sector and a live audience of 200 attendees.

The judges selected three teams to move forward into the Ideas Contest Finale on the second day of the summit.

Click here to see videos from the Top-10 pitch sessions

A sincere thank you to our esteemed panel of judges:



Olivia Steedman

Managing Director
of infrastructure
& natural resources
department at OTPP



Drew Fagan
University of Toronto
professor and former
Ontario deputy minister
of infrastructure



Douglas Buchanan
Co-head of Infrastructure
& Project Finance at
Debevoise & Plimpton



Maryse Roy
Financial Consultant
for startups, deep
infrastructure finance
experience



Michele Romanow

Entrepreneur, venture capitalist & Dragon's

Den TV personality



George Stalk
Senior Advisor &
Fellow at the Boston
Consulting Group



Robert Steiner
Director of Fellowships in Global Journalism at the Munk School



The Ideas Contest

Overall winner: IceGrid—A Renewable Energy Microgrid for Nunavut

IceGrid suggests building a fully renewable energy grid to power Iqaluit, Nunavut. Power would be generated by wind and solar, and stored in utility-scale batteries

Diesel power is very expensive in northern Canada. IceGrid's plan could slash long-term energy costs and carbon emissions, delivering breakthrough economic and environmental benefits

If this test case is successful, similar solutions can be scaled across northern Canada

Click here to see the team's proposal video and presentation



Team Members:

Brett Favaro, Brandon Copeland, Dave Lane





The Ideas Contest

Runner up: Redefining the Wastewater Utility Model

The Redefining the Wastewater Utility Model proposal focused on food waste diversion. The team laid out a bold transformation plan to enable waste water treatment plants (WWTPs) to process not only biosolids but also food waste

Food waste contains a high amount of energy.
The resultant biogas makes energy capture and utilization economical. The plan would provide energy for WWTPs, create new revenue streams for municipal utilities selling biogas and capture greenhouse gas emissions from landfills

Eventually, this idea could be rolled out to hundreds of WWTPs across Canada

Click here to see the team's proposal video and presentation



Team Members:

Karlıs Vasarais, Brandon Moffat, Jon Dogterom

The Ideas Contest Second runner-up: Taking the High Road

The Taking the High Road team pitched the development of dynamic wireless charging (DWC) lanes on Canadians highways. These DWC lanes would enable charging of electric vehicle (EV) batteries while driving

The team believes that the introduction of DWC technology, which is already being tested in Europe and Asia, would accelerate EV adoption and reduce range anxiety

Users would be located and billed via a link between their smartphones and roadside smart poles, which could also be used for dynamic traffic control. DWC technology can be installed without having to rebuild the entire road

Click here to see the team's proposal video and presentation



Team Members:

Jing Guo, Ji Song Sun, Hasnain Raza, Tashi Nanglo, Pavel Shmatnik, Aliyah Mohamed, Ben Couillard, Thanvin Giridhar





The Ideas Contest

People's choice: Electric Airship
Transportation System

Electric Airship Transportation proposed the development of a cargo airship transport network powered by clean hydrogen fuel cell propulsion

The team said that this ambitious project would do for northern Canadian communities and resource projects what the railway did for western Canada 140 years ago

Their airships are based on the successful designs of the 1930s, but brought into the 21st century using modern engineering and certified aviation components

If implemented, these airships could serve the 70% of Canada's landmass that has no roads. They could also operate year-round, carrying loads of up to 100 tonnes at up to half the current cost of long-distance transport alternatives in isolated regions

Click here to see the team's proposal video and presentation



Team Members:Barry Prentice (pictured), Dale George

THE OCTOBER LAUNCH

Starting the national conversation

The Globe and Mail and the BCG Centre for Canada's Future hosted more than 270 participants at the Infrastructure Leadership Event on October 4, 2017

Tony Keller, CanInfra emcee and *Globe and Mail* editorial page editor, kicked off the conversation by asking, "How do we make sure we pick the right infrastructure projects, and make them happen on time and on budget?"

A lively workshop with academics, students, public policy makers and C-suite executives followed, including our keynote speaker, Finance Minister Bill Morneau

During the afternoon lunch session Kilian Berz, Chair of the BCG Centre for Canada's Future, announced the CanInfra Ideas Contest. He called for university students, academics, think tanks, and any Canadian with a transformational infrastructure idea to step up and put their idea on the national agenda



Bill Morneau

Transformational infrastructure projects will drive our economy forward. Thank you @BCG for an insightful discussion today









KEY MESSAGES FROM THE SUMMIT



"

Getting something done, even if delayed or over budget, is usually better than not getting things done

MAYOR JOHN TORY



"

Canada needs people like you who are ready and willing to innovate and seize new opportunities

PRIME MINISTER JUSTIN TRUDEAU



"

It is these ideas that will help us decide what we need to do to make long term change in this country

FINANCE MINISTER BILL MORNEAU



Showcase panel: Perspectives from in-flight Canadian transformational projects

Making it happen: While the Ideas Contest focused on future transformational projects, today there are major in-flight projects that will provide step-change economic, environmental and social benefits for Canadians. Moving these complex projects forward requires effective partnerships, community engagement, and clear and consisten articulation of the benefits for multiple stakeholders



Digital panel: How can Canada be a world leader in digital infrastructure?

Data is the new oil for Canada: While not a traditional infrastructure asset class, digital infrastructure is clearly a major enabler for Canada to achieve the promise of our digital economy and society in the 21st century. This will require not just world-class connectivity such as 5G, but also strong governance and new infrastructure to manage our data



Fireside chat: A conversation with leaders from the Canada Infrastructure Bank

A new Canadian institution: The Canada Infrastructure Bank is a startup institution that will partner with various levels of government, the private sector, and communities to diffuse risks and help launch infrastructure projects that would not otherwise be viable. It will finance, advise, and share data and information



Private-sector infrastructure panel: How to leverage the private-sector to address Canada's infrastructure gaps

Leveraging world-class Canadian expertise: Canada's pension funds and infrastructure investment community are active around the world in infrastructure. "Crowding in" private capital and expertise will be critical to addressing Canada's large infrastructure gap. This will require new approaches to designing infrastructure projects and to funding and financing them

PERSPECTIVES FROM FINANCE MINISTER BILL MORNEAU

Minister Morneau opened the Summit with a keynote address to over 250 guests from the private and public sectors, followed by a fireside chat about infrastructure and Canadian economic competitiveness

The Minister enthusiastically thanked the 70 teams who entered the CanInfra Ideas Contest, praising the contestants for helping Canada to accelerate long term change. He spoke about a similar contest, the \$300M Smart Cities Challenge, that the Canadian government has launched to identify ideas that leverage technology to improve our lives and cities. The Minister said that it is ideas from contests like these that will help make the Canada Infrastructure Bank most effective

During his fireside chat, Minister Morneau spoke broadly about economic issues that are causing the business community concern, and about his belief that resolving those issues could lead to unlocking Canadian competitiveness. He went on to discuss several government initiatives such as the Supercluster program and trade with Asia. Returning to infrastructure, he said he is confident that international institutional investors would find large scale Canadian infrastructure projects attractive

Participants

Bill Morneau, Minister of Finance

Jim Leech, Special Advisor for the Canada Infrastructure Bank

David Walmsley, Editor in Chief, The Globe and Mail



PERSPECTIVES FROM IN-FLIGHT CANADIAN "TRANSFORMATIONAL" PROJECTS

Day 2's opening panel looked at three major in-flight transformational infrastructure projects, their benefits, and the key success factors needed to make them happen in the "real world"

Building support for transformational infrastructure

The panel focused on building support for transformational infrastructure by respectfully engaging stakeholders, building real partnerships and communicating benefits. The panelists agreed that sending a consistent message, finding common ground and developing win-win relationships with stakeholders are key

Margaret Kenequanash highlighted that speaking to the people affected by major projects—in particular, First Nations—is critical

Building effective partnerships

Major projects require strong partnerships. Investing effort up front to identify and build relationships with partners is vital, as is listening and learning along the way

Achieving social license

Kim Stangeby spoke about the need for community engagement and taking a broader view of the beneficiaries of infrastructure projects, while Rick Janega emphasized that trust had to be earned, and that it could also be lost

Participants

Rick Janega, COO, Emera

Margaret Kenequanash, CEO, Watay Power

Kim Stangeby, Chief Strategy and Growth Officer, GTAA

Andrew Willis, The Globe and Mail



HOW CAN CANADA BE A WORLD LEADER IN DIGITAL INFRASTRUCTURE?

This panel featured an engaging and passionate discussion of the rapidly evolving landscape around a new asset class for the 21st century: digital infrastructure

Data governance

The panelists discussed the importance of data and its impact on the economy. They noted that the private sector would push ahead rapidly, with a significant risk of regulation and public governance falling behind. They agreed that data was a critical issue for Canada and that a governance framework based on our values had to be put in place

Accessible data utilities for innovation and growth

Nadir Mohamed and Andrea Stairs spoke about the accessibility of data for businesses at all levels, highlighting that data should be held not only by larger players but by smaller businesses as well

5G, the digital divide and the future

The panelists agreed that 5G has enormous potential, but that even before 5G we must bridge the digital divide between rural and urban Canadians. They also noted that 5G infrastructure will be expensive, especially on a national scale, and that more work is required to define compelling use cases

Participants

Tawfik Hammoud, BCG Executive Committee and Global Head,
Principal Investors & Private Equity

Nadir Mohamed, Chair, ScaleUp Ventures

Andrea Stairs, General Manager, eBay Canada and Latin America
Christine Dobby, The Globe and Mail



Participants Janice Fukakusa, Chair, Canada Infrastructure Bank Bruno Guilmette, Interim CIO, Canada Infrastructure Bank Tony Keller, The Globe and Mail The Infrastructure Bank is really about providing an additional tool in order to get more funding of infrastructure...by partnering with various levels of government, private sector and of course the public...to accelerate the way we're enacting infrastructure JANICE FUKAKUSA

FIRESIDE CHAT WITH CANADA INFRASTRUCTURE BANK LEADERS

The fireside chat featured Canada Infrastructure Bank leaders sharing their vision and efforts to create a new Canadian economic institution with Tony Keller, editorial page editor of *The Globe and Mail*

Role of the Bank

The Bank will partner with various levels of government, the private sector, and communities to diffuse risks and launch revenue-generating infrastructure projects that otherwise wouldn't be viable. The Bank has three key mandates:

- Investment: Invest in projects to bridge risk for a certain period of time
- Project Advisory: Help government, the private sector and communities evaluate projects
- **Data mandate**. Provide data and information on the same basis for all parties

Status of development

The Bank is new and scaling up. The Board is active, the CEO has just joined, and the executive team is gaining traction. Project evaluation has started, moving toward project commitments for next year

Project investment process

The Bank will be more involved in the early stages of projects, where private investors see more risk. The Bank will bridge those risks for a period of time. It has \$35 billion of capital and is planning to "crowd in" three to four times that amount of private capital. The Bank will most often be a minority investor, rather than a primary project sponsor. Bank success criteria will include not just yield, but also the number of projects and societal impact

HOW TO LEVERAGE THE PRIVATE SECTOR TO ADDRESS CANADA'S INFRASTRUCTURE GAPS

This panel provided a lively discussion on the challenges (and potential solutions) of developing a stronger working relationship between the public and private sectors, and on how to leverage the world-class expertise of Canada's pension funds and institutional infrastructure investors

Funding vs. financing

There is confusion between the funding (e.g., user fees) and financing (e.g., leverage) of projects. A mismatch often exists between the long-term investor view and the view of government managers, who are forced to focus on annual cash budgets

Revenue focus

Infrastructure plans too often start in engineering offices. It is important to bring business case perspectives into the process much earlier and to generate projects with clearer revenue models

Restrictions on private investment

The need is massive, but private capital is often underutilized. There are major challenges in getting multijurisdictional projects developed and to market. Canadians would benefit from greater speed and certainty around our project approval processes



continued from pg.14

HOW TO LEVERAGE THE PRIVATE SECTOR TO ADDRESS CANADA'S INFRASTRUCTURE GAPS

The changing nature of infrastructure

The idea of infrastructure being "low-risk" is outdated. Infrastructure remains essential to society and the economy, but disruption from new technologies such as solar power and autonomous vehicles means that the risk profiles can be substantially different from those of traditional projects

Creating an environment for Public Private Partnerships

The Canada Infrastructure Bank can play a prominent role—particularly via its advisory mandate. Risk evaluation is often challenging for governments, but broader conversation with the private sector can help

Participants

Michael Bernstein, Special Investment Advisor, Waterfront Toronto

Jane Bird, Director, Canada Infrastructure Bank and Senior Advisor Bennett Jones LLP

Dag Detter, BCG Senior Advisor, author of Public Wealth of Nations

Jacqueline Nelson, The Globe and Mail



SUMMARY OF BREAKOUT SESSIONS



How can we build a more ambitious infrastructure project pipeline in Canada?

Many of Canada's most ambitious projects seem bogged down by complex and unpredictable approval processes or the challenges of aligning our multiple levels of government. There are no easy answers to these challenges, but clear communication of benefits, a concerted effort to streamline regulatory processes, and stakeholder consultation can help

Breakout experts:

Darwin Smith, Partner, BCG
Olivia Steedman, Managing Director Infrastructure and Natural Resources, OTPP
Craig Walter, Partner, Deloitte
Wayne Wouters, Strategic and Policy Advisor, McCarthy Tétrault



What digital infrastructure do we need to leverage our future data?

The group looked at breaking the perceived tradeoffs between privacy and data leveraging. New services and efficiencies are promising, but we face unprecedented citizen mistrust. Solutions must differentiate between physical data infrastructure, the policy level, and the nstitutions level. The latter is the most complex, but it holds the potential of new infrastructure such as data utilities

Breakout experts:

Dr. Ann Cavoukian, Senior Fellow, Ryerson University Vadim Gouterman, Partner, BCG Rob Meikle, Chief Information Officer, City of Toronto Sean Mullin, Executive Director, Brookfield Institute



What infrastructure is needed to support our cities' 21st century ambitions?

Urban mobility is a major pain point. The group discussed integrating an end-to-end view into planning and the need for inclusivity to be a primary design objective for the next wave of innovation around smart cities and regions. Private-sector solutions and user-pay revenue streams will be key to funding the infrastructure going forward, as will updated governance models across municipal boundaries

Breakout experts:

Brad Baker, Principal, BCG
Martin Canning, Chief Program Officer, Evergreen Canada
Augustin Wegscheider, Principal, BCG



BrainBlizzard: How to think creatively about transformational infrastructure?

The group explored shifting our mental models on infrastructure—from "asset ownership" to "asset sharing," for example. They explored how infrastructure would change if viewed through the mindset of Amazon, Disney, or Apple. Could your future subway commute involve an app that gets you to your last station just as your packages and groceries are being loaded into an autonomous shuttle for the last kilometer home?

Breakout expert:

Alan Iny, Associate Director, BCG, author of Thinking In New Boxes,



Unlocking public wealth

If we did a scan of public assets in Canada, we would probably be surprised at how big and valuable they are. A more structured way of valuing and managing these assets could unlock benefits for citizens and cashflows for our governments. This could be a big part of the answer to our infrastructure gaps

Breakout expert:

Dag Detter, BCG Senior Advisor, author of The Public Wealth of Nations

BREAKOUT SESSIONS









REMARKS BY PRIME MINISTER JUSTIN TRUDEAU

Prime Minister Justin Trudeau delivered closing remarks for the CanInfra Summit, emphasizing the changing landscape that cities face today and the need for Canada to constantly innovate for both the near term and the long term

The Prime Minister elaborated on the government's infrastructure plan, pointing to the need to move new projects forward more quickly in order to grow communities now, not ten years from now

He also spoke about how the government strives to modernize infrastructure planning. This effort includes the Smart Cities Challenge, an ideagenerating competition similar to the CanInfra Ideas Contest

The Prime Minister expressed confidence that the Canada Infrastructure Bank will help us to better leverage private capital and expertise to address the country's critical needs



DRIVING A NATIONAL CONVERSATION



Contest seeks 'transformational' projects to boost the Canadian economy



Corridors like the Canadian Pacific Railway (pictured), the Trans-Canada Highway and the St. Lawrence Seaway represent massive Canadian infrastructure accomplishments of past centuries.

THE CANADIAN PRESS



The University of Manitoba's Barry Prentice and his Electric Airship Transportation System has won the \$25,000 People's Choice award in a national infrastructure innovation competition...



eBay Canada Business

Thanks #CanInfra for hosting and engaging an important conversation on Canada's digital infrastructure among experts and leaders such as @eBayCanada's @astairsk, Tawfik Hammoud, Nadir Mohamed, and the @globeandmail's @christinedobby. #infrastructure #Toronto





Dr. Brett Favaro

Margaret Kenequanash (CEO of Watay Power) teaching us why it matters to take the time to seek consent among communities for major projects. Key point: Indigenous communities have rights, and are here to stay. If we want to do business, engage properly. #CanInfra



Dorinda So

Love how the convo about digital infrastructure leads to a data convo. @Institute_ICP's advisory board member @astairsk of @eBayCanada taking it to the next level and reminding us of the digital divide that exists & how to access to infra can scale SMEs #CanInfra



Prime Minister Trudeau congratulated our CanInfra contest participants this evening saying: "Canada needs people like you who are ready and willing to innovate and seize infrastructure opportunities." Thank you Prime Minister!





Jonathan Dogterom

A productive 2 days spent raising the profile of #biogas in the #CanInfra Challenge... congrats to Ice Grid and all the other teams. Valuable discussions on private and public partnership models for infrastructure. Collaborations like this lead to better #infrastructure.





N.L. team wins national competition with IceGrid, to replace diesel plants in northern Canada







ACKNOWLEDGMENTS

Thank you to all our teams, volunteer coaches and reviewers, speakers, panelists, breakout experts and staff from our sponsors and supporters:

Nina Abdelmessih, Kazi Ahmed, Norm Anderson, Sekhar Angepat, Mark Bain, Brad Baker, Kate Banting, Michael Bernstein, Kilian Berz, Jane Bird, Michael Block, Andre Borges, Clement Bourgogne, Karen Bray, Douglas Buchanan, Martin Canning, Dr. Ann Cavoukian, Hannah Cowan, Baptiste Creteaur, David Dal Bello, Derek DeCloet, Dag Detter, Jean Marc Dieu, Anguel Dimov, Christine Dobby, Pascal Drolet, Josh Van Duerzen, Jordan Eizenga, Drew Fagan, Carly Fernandes, Andrew Fleming, Janice Fukakusa, Shawn Gao, Andy Gibbons, Susan Gray, Aayush Goel, Vadim Gouterman, Bruno Guilmette, Roshina Hall, Keith Halliday, Tawfik Hammoud, Amina Hasan, Helen He, Katherine Holden, Alan Iny, Ahsan Irfan, Jawa Ishang, Kate Jamieson, Rick Janega, Tony Keller, Margaret Kenequanash, Mohsin Khandwala, Peter Kim, Katie Kirkconnel, Katharine Lake Berz, Warrick Lanagan, Jim Leech, Rene Lubianski, Laurie Mahon, Rob Meikle, Danielle Millburn, Vahid Mirjalili, Dipesh Mistry, Nadir Mohamed, Bill Morneau, Sean Mullin, James Nauss, Jacqueline Nelson, Devin O'Brien, Brinda Patel, Parham Peiroo, Allison Perlman, Erik Reed, Kallie Reynolds, Roberto Robert-Giron, Michele Romanow, Jeff Rosenthal, Maryse Roy, Diego Sanchez, Doug Saunders, Vinay Shandal, Darwin Smith, John Stackhouse, Andrea Stairs, George Stalk, Kim Stangeby, Olivia Steedman, Robert Steiner, Matthew Su, Ian Taylor, John Tory, Justin Trudeau, Vickie Turnbull, Rhonda Towner VanBuskirk, David Walmsley, Craig Walter, Augustin Wegscheider, Andrew Willis, Wayne Wouters

Thanks to CanInfra's sponsors







RBC Capital Markets





Brookfield



Deloitte.

"

It is these ideas that will help us decide what we need to do to make long term change in this country

BILL MORNEAU MINISTER OF FINANCI