



**CANADIAN COUNCIL OF PROFESSIONAL ENGINEERS
CONSEIL CANADIEN DES INGÉNIEURS**

**Brief to the
Standing Committee on Finance
Regarding
The Federal Government's
Pre-Budget Consultation Process**

Presented by:
Marie Lemay, P.Eng., ing., Chief Executive Officer

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Section I: Who We Are

The Canadian Council of Professional Engineers (CCPE) represents the 12 provincial and territorial associations/ordre that regulate the practice of engineering in Canada and license Canada's 160,000 professional engineers. As the national voice of engineering in Canada and with its network of expert volunteers, CCPE is well positioned to contribute impartial advice to government in the budget process across a wide range of topics where engineers have specialized experience.

Established in 1936, CCPE promotes consistency in the regulatory and licensing practices of its members, and works to streamline national and international mobility for engineers. Not a licensing body itself, CCPE's role is to facilitate consistency among the provincial and territorial regulatory bodies in areas such as educational standards, ethics and qualification guidelines governing engineering.

Section II: Executive Summary

For the last five years that CCPE participated in the pre-budget consultations, we've tabled recommendations during the pre-budget process and via appearances before other parliamentary committees that we believe will benefit all Canadians. The issues that we have addressed include: investment in entrepreneurial potential and the commercialization of innovative practices; enhancing investments in human resources; and investing in our infrastructure assets.

In partnership with the Government of Canada, we've made tremendous strides on some of these topics. Despite the progress, Canada's engineers feel there is room for lawmakers to spur productivity and enhance public safety through:

- 1. Funding for a comprehensive national assessment of engineering works in Canada to determine the vulnerability of public infrastructure to climate change.**
- 2. Embracing a new long-term, holistic vision for rejuvenating Canada's ailing infrastructure systems, by supporting the creation of a National Round Table on Sustainable Infrastructure (NRTSI). The NRTSI would bring together an important yet highly diverse and complex community to generate greater understanding and synergies so as to identify investment and maintenance priorities as well as supporting the community's optimal use of available resources.**

CCPE believes by deferring investment in core areas of infrastructure and its vulnerability to climate change, Canada will be saddled with a nagging list of deficiencies, including threats to public health and safety, negative impacts to the environment, higher operating costs for government and businesses, lost productivity, and the prospects of higher capital costs and budgetary pressures.

Failure to invest in interrelated areas of infrastructure and climate change will result in a transfer of even greater costs to future generations. The social costs, as well as the costs incurred by repairs and disruption of economic activity can be reduced through adequate preparation now.

One needs look no further than the lessons learned in the United States. The \$200 billion (USD)¹ in estimated damage caused by Hurricane Katrina vastly outstrips the \$13-15 billion (USD) previously estimated as required to repair the levee system protecting the city of New Orleans. Policy makers on this side of the border should regard the recent example in the US Gulf States as a cautionary tale of the risks of not adequately investing in infrastructure.

¹ Unless otherwise noted all figures are in Canadian dollars.

RECOMMENDATIONS:

Adapting to the Impacts of Climate Change

Recommendation #1:

Provide adequate funding to conduct a thorough, national assessment of the vulnerability of Canada's public infrastructure (federal, provincial and municipal) to the impacts of climate change. The national assessment will enable decision-makers to establish and justify spending priorities on strategies and actions that anticipate and adapt to climate change impacts across the broad spectrum of public infrastructure.

A Coordinated Strategy to Tackle Infrastructure Renewal

Recommendation #2

A well-coordinated strategy for infrastructure renewal must include funding for the creation of a "National Round Table for Sustainable Infrastructure" (NRTSI). The NRTSI would draw its membership from a wide pool of infrastructure stakeholders who would be tasked to:

- develop a national infrastructure action plan;
 - report on the state of infrastructure in Canada; and,
 - identify spending priorities for capital investment and the maintenance of existing civil works.
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Section III: CCPE Actions to Date

In the twelve months since CCPE last appeared before the Finance Committee, we have continued to represent the public's interest by pursuing opportunities to engage policymakers in dialogue on issues such as climate change adaptation and infrastructure renewal. CCPE, its constituent members, its staff and its volunteers have made significant progress on the aforementioned issues.

CLIMATE CHANGE ADAPTATION: Identifying vulnerabilities to save lives and ensure economic security

Climate change profoundly affects the way we live, the way we build our homes, roads, water systems, bridges, and our communities. Furthermore, climate change exposes our existing and aging infrastructure assets to changing climatic conditions for which they were not initially designed to withstand, thereby reducing their serviceable lifespan, exposing them to risks of catastrophic failure, and potentially risking lives. Consequently, to maintain public safety, engineers will need to design civil works capable of adapting to new climatic extremes.

Since the late 1990s, there has occurred a ten-fold increase in global financial losses due to natural disasters that can largely be attributed to more frequent and devastating climatic events. Canada is not immune to weather related catastrophes; nor should we expect to get off lightly.

- The Saguenay Flood in 1996 produced the largest overland deluge in Canada this century. This event resulted in the deaths of 10 people and forced 12,000 people to flee their homes. Insured losses exceeded \$200 million; together with uninsured losses and indirect costs to the economy, total losses may have exceeded \$1.5 billion.
- The 1997 Manitoba Flood was the worst flood in the Red River Valley in the last 100 years. It caused an estimated \$400 million in damage in Manitoba and 28,000 people were driven from their homes. The impact would have been even greater had it not been for the Red River Floodway that diverts floodwater around Winnipeg, a classic example of adaptation.
- The 1998 Ice Storm was blamed for more than 25 fatalities. Millions of Canadians from Eastern Ontario to Atlantic Canada were affected. Insured losses totalled \$1.44 billion, additional losses were estimated at \$1 billion to replace transmission lines and an additional \$1 billion for loss of income.
- The 2003 British Columbia forest fires were caused by unusually hot and arid conditions throughout the southern interior of the province. Over 250 homes were destroyed and tens of thousands were forced to flee to emergency shelters. The Council of Forest Industries estimated that the forest fires burning in British Columbia damaged trees worth as much as \$5.6 billion as finished lumber.

- In 2004, a massive flood in Peterborough caused more than \$95 million in insured damages.
- Earlier this year, a severe storm pummelled communities from Kitchener-Waterloo to Toronto. The aftermath resulted in 15,000 reported insurance claims and over \$400 million in damages, making it the most devastating storm in Ontario's history.

With financial assistance from the federal government, CCPE has created the *Public Infrastructure Engineering Vulnerability Committee* (PIEVC), a national committee to facilitate a pan-Canadian assessment of the vulnerability of our infrastructure to climate change. This will ensure that Canadian communities are equipped to respond appropriately to extreme climatic events that threaten to become more pronounced in future years,.

The major objective of PIEVC is to provide a regional assessment of the vulnerability of Canada's existing and future infrastructure to the impacts of climate change. Using input from engineers from across Canada, it will provide a national and regional picture of the vulnerability of different types of buildings and infrastructure such as dams, water and wastewater systems, pipelines, roads, bridges as well as other engineering works. The assessment will encompass urban and rural areas in all regions of Canada.

The functions and responsibilities of the PIEVC include:

- Developing the terms of reference for a national assessment of the vulnerability of public infrastructure to climatic change and overseeing the study;
- Acting as a steering committee during the assessment;
- Defining and classifying categories of public infrastructure that are vulnerable to climate change;
- Reviewing and advising on existing codes, standards and guidelines; and,
- Reviewing and advising on the need for, and development of, new codes, standards and guidelines.

The PIEVC includes assistant deputy ministers from the Government of Canada, representing several departments including: Natural Resources Canada; Infrastructure Canada; Transport Canada; Environment Canada; and, the National Research Council. It also comprises senior representatives from provincial and municipal governments as well as NGOs such as the Federation for Canadian Municipalities (FCM) and the Canadian Standards Association.

INFRASTRUCTURE: A round table for success

A civilization's rise, fall and survival is linked to its ability to feed and shelter its people. These capabilities depend on infrastructure – the underlying, often hidden foundation of a society's wealth and quality of life. A society that neglects its infrastructure loses the ability to transport people and food, provide clean air and water, control disease and conduct commerce.² In the same way that doctors and nurses are the trustees for public health care, engineers are the guardians of infrastructure.

² See — United States National Science Foundation, *Federal Policies to Foster Innovation and Improvement in Constructed Facilities*, 1996.

Domestically, Canada's infrastructure system represents a \$1.6 trillion asset, an asset which if not carefully maintained—let alone rejuvenated—could be subject to breakdown and failure at critical junctures.

This past summer witnessed several examples of how inadequate infrastructure can affect productivity and the overall health of a society. Residents of Canada's industrial heartland were asked to conserve electricity. They also experienced record numbers of smog days, caused in part by idling cars on congested roads. We also saw the destruction of a major American city, which relied on an outdated system of levees to protect its neighbourhoods.

It's with full understanding of the importance and the sheer size of the issue, that CCPE has been working with government to affect change. In 2003, CCPE partnered with other infrastructure stakeholders including the Canadian Public Works Association (CPWA), the National Research Council (NRC), and the Canadian Society for Civil Engineering (CSCE) to unveil the Technology Road Map (TRM) for infrastructure.

The TRM is a comprehensive report that contains ten objectives and ten recommendations aimed at charting new and innovative ways to improve the maintenance and rehabilitation of our road and water systems, while simultaneously negotiating consensus amongst the infrastructure industry, and identifying the technological needs and other components required to update our civil works.

The final report is a national vision resulting from a process that succeeded in bringing together numerous stakeholders in the infrastructure industry.

Since the TRM report was released, its partner organizations have commenced efforts to achieve its core recommendations. CCPE specifically, has marshalled its resources and initiated meaningful dialogue with officials from Infrastructure Canada, provincial departments, the FCM, and the infrastructure community that are aimed at creating a National Round Table for Sustainable Infrastructure (NRTSI).

After developing a concept paper addressing the mandate, deliverables, governance and potential membership, consultation took place through presentations and meetings. As a next step, the infrastructure community will be meeting on December 8 to discuss the NRTSI concept and initiate the work of the round table. We have asked the federal government to play a leadership role in this effort by financially supporting the NRTSI.

Section IV: Recommendations to Government

CLIMATE CHANGE

The Issue:

What are the threats to infrastructure and public welfare from climate change?

The Inter-Governmental Panel on Climate Change (IPCC) defines vulnerability as the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate, including climate variability and extremes. The vulnerability of infrastructure is a function of the character, magnitude and rate of climate change variation to which a system is exposed, its sensitivity, and its adaptive capacity.

There is consensus that climate change is occurring and is affecting engineering works such as buildings and infrastructure that have life spans of up to several decades. Indications are that these works will be exposed to new environmental conditions and new vulnerabilities which they were not designed to withstand during their operational lives, thereby calling into question the validity of current engineering codes, standards and methods of practise.

The Need:

Responding proactively to climate change, identifying and assessing risks to public works.

Because infrastructure will be profoundly affected by changes in climate, it is imperative that governments begin now to assess and identify the vulnerabilities of public works to the realities of climate change. Identifying weaknesses in the system is an essential task, given the need to ensure continuity of service, economic growth, and most vitally, protection of the public, as the effects of climate change become more widespread and acute.

There is a need to provide a national assessment of the vulnerability of Canada's existing and future public engineering infrastructure to the impacts of climate change. It would provide a national and regional picture of the vulnerability of different types of buildings and infrastructure such as dams, water and wastewater systems, pipelines, roads, bridges and other engineering works in urban and rural areas across Canada.

With funding from the federal government through Natural Resources Canada (NRCan), CCPE has already begun work on the scoping phase of a project designed to provide an assessment of the vulnerability of Canada's existing and future engineering infrastructure to the impacts of climate change. While the government has already demonstrated its commitment to this project thus far, we still require additional funds to complete the national assessment based on the results of the scoping phase.

Furthermore, there will be a need to consult with engineers, scientists and communities. It will require a broad understanding of vulnerability needs including identification of the magnitudes of risks. It will be necessary to assess other external factors to develop

holistic approaches that adapt for climate change while responding to other environmental, social and financial factors. Ultimately, it will require innovative, yet practical methods that enable effective prioritization and decisions on adaptation measures for areas and types of infrastructure that have the greatest vulnerability.

This effort will require bringing together the scientific and engineering expertise with those who make decisions concerning investments in public infrastructure at all levels of government. CCPE has established a national committee called the *Public Infrastructure Engineering Vulnerability Committee*, or PIEVC, to serve as the mechanism for the engineering profession to focus attention on this issue and bring together all the stakeholders.

While funding for the initial project definition phase is currently in place through the work of the PIEVC, the funding required to do the assessment itself is not yet secured.

The challenges and financial costs of completing the assessment study will be extensive and will therefore require funds from the Government of Canada to support its completion. The assessment itself is expected to be in the order of several million dollars. PIEVC is prepared to develop a more detailed cost estimate as part of the initial project definition phase.

Recommendation #1:

Provide adequate funding to conduct a thorough, national assessment of the vulnerability of Canada's public infrastructure (federal, provincial and municipal) to the impacts of climate change. The national assessment will enable decision-makers to establish and justify spending priorities on strategies and actions that anticipate and adapt to climate change impacts across the broad spectrum of public infrastructure.

This national assessment will provide decision-makers with an important tool to plan and prioritize adaptation measures within a risk assessment framework. The degree to which government and the general public is willing to recognize risks associated with the impact of climate change on infrastructure will require the results of a detailed assessment. Once the degrees of acceptable risk are established for each type of infrastructure in each region, it will be our duty as engineers to develop and implement the adaptive measures.

INFRASTRUCTURE

The Issue:

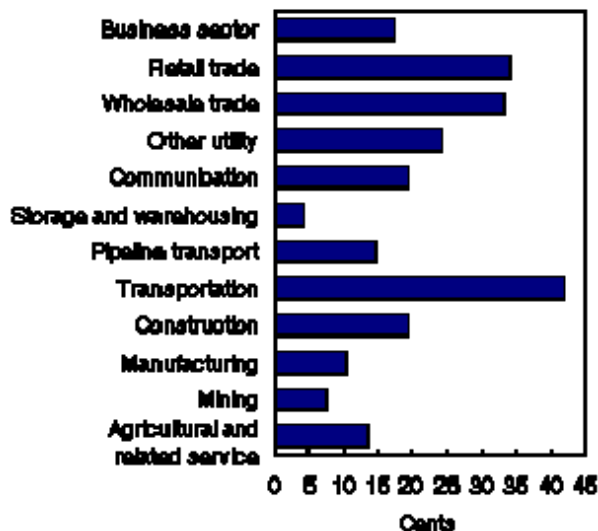
Infrastructure renewal in Canada

Canadians have prospered and enjoyed high standards of living and productivity, thanks largely to the benefits accrued by a large and reliable inventory of safe and essential public assets, such as water and sewer systems, and roads. Nevertheless, the health and viability of our infrastructure systems depend on sustained investment for lifecycle maintenance. Public funding is also required for new capital outlays to meet the demands of Canadians as well as support economic growth and environmental stewardship.

Canada's \$157.3 billion³ in publicly-owned infrastructure, such as, roads, mass transit, water supplies, and wastewater treatment facilities have a tangible impact on the productivity and the economic performance of the Canadian business sector.

This year's theme for the pre-budget consultations is "productivity and prosperity". Just as there is a link between a well-funded and maintained infrastructure network and public safety, there is also a connection between productivity and infrastructure. According to Statistics Canada, "public infrastructure, or 'public capital,' lowers the costs of producing a given level of output in virtually every Canadian industry within the business sector."

Marginal benefits of \$1 of public infrastructure capital to the Canadian business sector (average cents for the 1961-2000 period)



As seen in the above graph, there is a direct relationship between investment in infrastructure and productivity.

Statistics Canada further states that, "in the simplest terms, a well-constructed highway allows a truck driver to avoid back roads and to transport goods to market in less time. Hence, public investment in a highway enables private companies to produce their products at a lower total cost. This would permit products to be sold at lower prices, and lower prices can be expected to lead to growth in output."⁴

Sadly, the Government of Canada falls well behind the United States and the European Union in infrastructure spending on a per capita basis.⁵ The good news is that the Government of Canada is pointed in the right direction based on the elevated priority infrastructure has become:

³ StatsCan, *The Daily*, Wednesday, November 12, 2003.

⁴ Ibid.

⁵ For the years 1994-2003, the Government of Canada dedicated roughly \$12 billion CDN for program spending on infrastructure. Over the same interval the US federal government directed \$217 billion (USD) for its transportation infrastructure program alone.

- In the 2004 federal budget, the government provided a GST rebate to municipalities in order to invest in critical priorities such as roads, transit and clean water. For year 2004, the GST exemption amounted to \$580 million; over the span of ten years it will amount to approximately \$7 billion to promote urban renewal.
- In 2003, federal budget allocated \$3 billion for investment in infrastructure over ten years to go alongside previous investments of \$5 billion announced in the 2001 federal budget.

Despite these investments, by present estimates, our national infrastructure debt now totals \$60 billion dollars. In the absence of an enormous investment of public dollars, and without sustained funding by all three levels of government, Canada's infrastructure debt could climb to \$110 billion by 2028.

These may be conservative estimates. In a report authored by the Canada West Foundation and using research conducted by McGill University, the foundation warned, "If corrective action is not taken... the required funds for the entire country's public infrastructure could reach as high as \$400 billion by 2015-2020."

The consensus, based on a broad review of the evidence and literature supplied by organizations such as the FCM, TD Economics, the Canadian Mortgage and Housing Corporation, the Canadian Water and Wastewater Association, the Public Policy Forum, the Conference Board of Canada, and countless others, is that the infrastructure debt is an albatross that lawmakers cannot ignore.

The Need:

Collaborating with industry experts to ensure de-politicized, strategic investment, and applying innovative solutions for infrastructure renewal.

Addressing the need for infrastructure renewal is one of the most daunting financial challenges facing all levels of government. Governments are committed to maintaining balanced budgets but are confronted with competing priorities for funds. This requires policy tools that achieve efficiencies, value and benefit to the taxpayer. We believe that infrastructure renewal urgently requires more money and are ready to work together with governments to develop a coordinated approach on infrastructure renewal strategy.

Recommendation #2

A well-coordinated strategy for infrastructure renewal must include funding for the creation of a "National Round Table for Sustainable Infrastructure" (NRTSI). The NRTSI would draw its membership from a wide pool of infrastructure stakeholders who would be tasked to:

- **develop a national infrastructure action plan;**
- **report on the state of infrastructure in Canada; and,**
- **identify the Government of Canada on spending priorities for capital investment and the maintenance of existing civil works.**

Section V: Conclusion

Canada's engineers have a legacy of innovation and enterprise that has helped to enrich our country, build safe communities and contribute meaningfully to the wealth and productivity of our country. From the CPR to the St. Lawrence Seaway, to the Confederation Bridge, Canadian engineers have stood shoulder to shoulder with Canada's political visionaries and have contributed significantly to our national prosperity and quality of life.

CCPE and its constituent members are marshalling the energies of the 160,000 member strong engineering community, and demonstrating leadership on issues like climate change adaptation, and the national round table on sustainable infrastructure.

In the interest of enhancing our national productivity, we therefore call on the federal government to:

- provide funding to support the creation of a National Round Table on Sustainable Infrastructure which would tap into the expertise of industry experts as well as the entire infrastructure community to provide advice to government on identifying investment and maintenance priorities as well as support the community's optimal use of available resources; and,
- work within the PIEVC framework to devote adequate funds for a comprehensive assessment of the vulnerability of Canada's infrastructure assets to the impacts of climate change.

CCPE believes, that public policy matched by funds to support these initiatives will contribute significantly in both the short and long-term for enhanced safety, prosperity and productivity.