Leadership in Sustainable Infrastructure
Leadership en Infrastructures Durables

Case Study

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ADAPTATION PLATFORM INFRASTRUCTURE AND BUILDINGS WORKING GROUP: CANADIAN INFRASTRUCTURE AND BUILDINGS CLIMATE CHANGE ADAPTATION STATE OF PLAY PROJECT

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1 PROJECT ABSTRACT

The Infrastructure and Buildings Working Group (IBWG) was established by the Institute for Catastrophic Loss Reduction (ICLR) and Engineers Canada, in consultation with Natural Resources Canada, in 2013 and is part of Canada's Adaptation Platform. The IBWG's purpose is to build capacity, generate evidence and provide outreach to increase the capability of infrastructure managers, municipalities, builders, insurers, engineers and other relevant stakeholders to adapt and facilitate adaptation to climate change. The IBWG is comprised of federal, provincial, private industry and non-government representatives working in the field of climate change adaptation and disaster risk reduction.

The Infrastructure and Buildings Adaptation "State of Play" project will provide an overview of key adaptation activities and adaptation gaps at the national scale in Canada. The project draws on input from a variety of key infrastructure and adaptation experts in Canada, literature reviews, and the input of the IBWG. Amec Foster Wheeler and Credit Valley Conservation are leading the project.

Vulnerability assessments have been carried out across Canada that have demonstrated the risks to Canada's infrastructure systems, and thereby, to the communities served by those systems. Rising temperatures, altered hydrological conditions, and more frequent extreme weather events all pose a risk to Canada's water, building, transportation, information and communications technology and other infrastructure.

A variety of factors influence the level of risk associated with future climate change. Some infrastructure systems, such as stormwater management systems, are missing from Canadian communities that were built prior to today's standards. The result is a risk to flooding under today's climate, with future climate change only exacerbating the issue. Such stormwater infrastructure

systems are not resilient to climate risks such as flooding. However, they have been rated as in good condition by federal benchmarking studies, which have only considered age and condition, rather than the ability of those systems to provide modern, widely accepted levels of service. Other infrastructure, like drinking water systems, have been designed to provide an adequate level of service to the communities they serve under today's climate conditions, but may not continue to do so in the future.

In many circumstances interconnections between these infrastructures support the production and distribution of goods and economic services. Overall, there are many interdependencies between the infrastructure sectors and failure in one area can quickly lead to cascade failure. Many components of infrastructure are typically co-located (e.g. power cables laid below roads and beside communications cables, adjacent to water and gas mains and sewers), especially in urban areas. An extreme rainfall event in on August 19, 2005 in Toronto had many negative impacts, including flood damage to thousands of homes and roughly $740 million in insured losses (2015 CAD). The failure of Finch Avenue during this event, an arterial thoroughfare in North York, affected both the roadway and co-located infrastructure, including gas mains, water mains, sewer, telecommunications and recreation infrastructure. The Finch failure highlighted how the failure of one infrastructure system can severely impact others.

Canadian communities and senior levels of government have begun to recognize the risks posed by climate change. Events such as the 2013 Alberta and Greater Toronto Area floods and other extreme weather events have demonstrated the vulnerability of infrastructure. Many municipalities and senior levels of government that have recognized their infrastructure's vulnerability to climatic events and to future climate change have begun taking steps to improve the resiliency of their infrastructure through adaptation actions.

Climate risks to Canada's buildings and infrastructure reaches beyond the systems themselves. The July 8, 2013 storm in Toronto was linked to approximately $1 billion in damages (2015 CAD), but climatic events have other social costs as well. When important public infrastructure, such as drinking water, hospitals, schools and roadways are impacted by climatic events, it is often the most vulnerable members of the community who bear the brunt of the impact.

The principal objective of this study is to identify the current state of climate change adaptation actions across Canada focussed on improving resiliency of infrastructure systems, with a focus on the following themes:

- Watershed Infrastructure
  - Stormwater Infrastructure
  - Wastewater Infrastructure
  - Drinking Water Systems
  - Watersheds
- Urban Public Transportation Systems
- Engineered Buildings
  - Residential
  - Hospitals

    - Correctional Facilities
- Non-Engineered Buildings (as defined in Part IX of the National Building Code of Canada)
- Other Infrastructure
    - Information and Communications Technology

The study emphasizes the impact of adaptation actions on public and community services, and the people who depend on them. An outcome of the study will be identification of gaps and opportunities that exist given the current state of climate change adaptation in Canada.