XVI WORLD WINTER SERVICE AND ROAD RESILIENCE CONGRESS
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Session Report

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FORESIGHT SESSION RF 2 - ADAPTING INFRASTRUCTURE FOR RESILIENCE: RESEARCH AND EXPERIENCE
MONDAY, FEBRUARY 7, 6:00 PM TO 07:30 PM, MOUNTAIN STANDARD TIME

1. KEYWORDS

Adaptation, resilience, climate change, infrastructure

2. PRESENTATION OF THE SESSION

Around the world, the transportation sector faces serious challenges to ensure infrastructure is resilient to the impacts of climate change, including unpredictable weather and storm events. In Canada, recognizing that resilient infrastructure is critical to our current and future way of life, a variety of organizations are working on adaptation initiatives. This session shared research and experience as we all strive to ensure transportation networks continue to provide the level of service that global economies and communities require every day.

3. PROGRAMME OF THE SESSION

Session Chair: Paul McConnell, TAC President, Deputy Minister, Yukon Highways and Public Works
Session Organiser: Sarah Wells, Executive Director, Transportation Association of Canada
Session Secretary: Sarah Wells, Executive Director, Transportation Association of Canada

Speaker	Position	Presentation
Paul McConnell	Deputy Minister, Yukon Highways and Public Works	Session Overview
Dr. Zoubir Lounis	Principal Research Officer, National Research Council Canada	Designing Resilient Transportation Infrastructure in a Changing Climate
David Lapp	Senior Advisor, Institute for Catastrophic Loss Reduction	Transportation Applications of the Public Infrastructure and Engineering Vulnerability Protocol
Anne-Marie Leclerc	Sous-ministre adjointe, ministère des Transports du Québec	Adaptation des infrastructures au ministère des Transports du Québec face aux changements climatiques
Paul Murchison	Executive Director, Major Transportation Programs, Yukon Highways and Public Works	Managing Yukon's Transportation Infrastructure in a Changing Climate

4. TECHNICAL FINDINGS AND DEBATE

Climate change is an issue that is critically important to Canadians and all people around the world. Canada is a geographically diverse nation with almost 10 million square kilometres landmass and only 4 people per km^2; transportation is essential to the Canadian economy, mobility, safety and security. Given the importance of transportation in Canada, and in the face of climate change realities, resilient infrastructure is critical to our way of life. The objective of the session was to share Canadian research and experience in adapting infrastucture for resilience that may be helpful to other practitioners around the world.

Dr. Zoubir Lounis presented Canada's National Research Council ground-breaking work to integrate climate resilience into building and infrastructure design, guides, and codes. This initiative is driving innovation and providing science-based knowledge and tools to make sound decisions about how to design, operate, and maintain infrastructure assets. He emphasized that climate change can lead to increased loads on transportation infrastructure which can result in reduced safety, serviceability, durability, functionality, capacity and shortened service life. He argued that transportation infrastructure needs to be designed and maintained using future climatic design data and loads to ensure climate-resilient and sustainable transportation infrastructure.

David Lapp presented about the Public Infrastructure Engineering Vulnerability Committee (PIEVC) Protocol, a qualitative process to assess climate risk and vulnerability of civil infrastructure and buildings at a screening level. The Protocol establishes the adaptive capacity of infrastructure to support informed engineering judgments on components that require adaptation and how to adapt them. Mr. Lapp presented examples of the application of the Protocol to assess the climate risk for transportation infrastructure at sites across Canada and around the world.

Anne-Marie Leclerc presented some of the challenges being experienced in Quebec as a result of the changing climate, and she highlighted testing and monitoring practices, and a decision-making tool for evaluating and implementing adaptive strategies. She noted that adapting to climate change must be progressive and consider socio-economic impacts. She called for more development and dissemination of science and knowledge transfer to integrate with management tools. She said standards and tools for project management, design and operation must be updated so they take adaptation to climate change and its impacts into account.

Paul Murchison provided an overview of work underway to improve the understanding of the physical and financial impacts of climate change on transportation infrastructure in Yukon, to support the advancement of research to address the challenges, and to adapt transportation engineering practices to develop infrastructure that is resilient to climate change.

In discussion, presenters discussed the importance of recognizing the risks and impacts of climate change and beginning to take action to ensure resiliency in infrastructure assets. It was noted that climate considerations should be included in engineering processes, including procurement of design, construction, operation and maintenance services. There are also significant financial considerations: ensuring infrastructure is resilient can be more expensive in terms of capital costs as well as in operation and maintenance. Extreme weather can create emergency situations, which are enormously problematic for governments and citizens. Agencies need to address the short term challenges of climate change and at the same time plan and adapt to avoid future crises.

5. RECOMMENDATIONS FOR DECISION MAKERS, FOR PIARC OR FOR INTERNATIONAL ORGANISATIONS

Climate change is a complex issue and adapting infrastructure for resilience is also a complex challenge. It will take time and resources to tackle the problem but it is a pressing priority that we must begin to address now.

It is essential to understand the link between climate and risk. Adapting infrastructure should be informed by understanding climate risks and data. Practitioners must think about the future when designing infrastructure so that asset service life does not begin from a deficient position.

Nations must work together to share knowledge and expertise for everyone's benefit. Weather and climate do not respect boundaries so we must collaborate to tackle adaptation needs and challenges around the world.

6. PREPARATION OF THE SESSION

The following individuals contributed to the planning and development of the session:
David Lapp
Anne-Marie Leclerc
Zoubir Lounis
Paul McConnell
Paul Murchison
Sarah Wells
Madeleine Bélanger-Dumontier