



TRANSPORTATION AND ADAPTATION A Canadian Perspective

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June 7-8, 2018



OVERVIEW

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- 2 | Climate Risks to the Canadian Transportation System
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1 | CANADA'S TRANSPORTATION SYSTEM







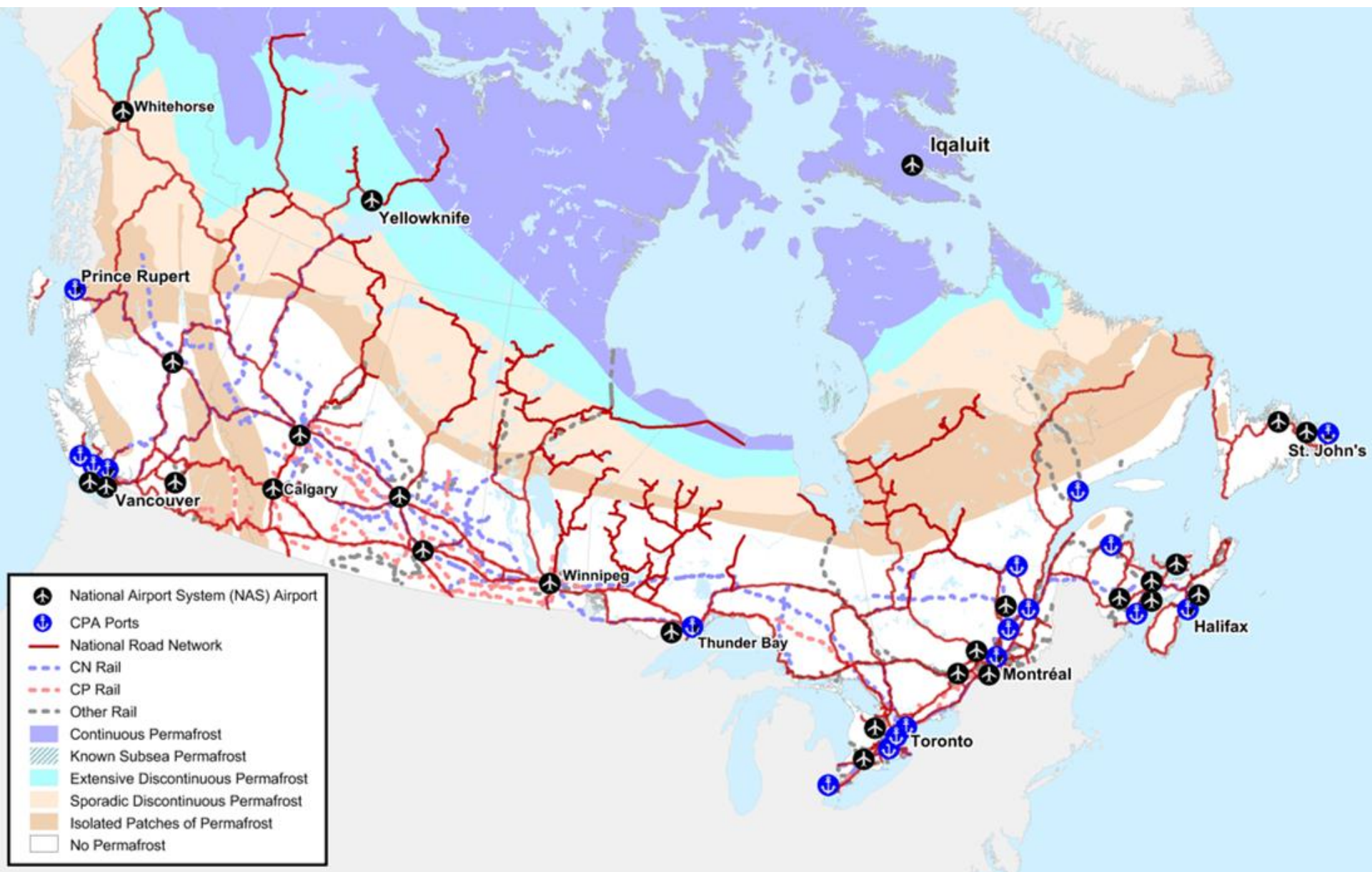
CANADA'S MULTI-MODAL TRANSPORTATION INFRASTRUCTURE NETWORK

-  **Airports:** 26 National Airport System (NAS) airports; Regional/local (71), remote (13) and Arctic (11) airports; 1594 certified sites

-  **Ports:** 18 Canadian Port Authorities (CPA); Nearly 550 public ports and 1035 small craft and fishing harbours





-  **Rail:** Nearly 46,000 route-kilometres of track; Majority Canadian National Railway (49%), Canadian Pacific Railway (26%), other railways (24%); Via Rail operates passenger rail services

-  **Roads:** More than 1.13 million two-lane equivalent lane-kilometres of public road; 38,000 km National Highway System, and winter roads



2016 | PASSENGER / TRADE FLOW STATISTICS

Travellers

-  **Airports:** 140 million enplaned and deplaned passengers
-  **Ports:** International cruise ships carried approximately 1.4 million passengers; BC Ferries carried approximately 17.2 million passengers on various routes
-  **Rail:** 4 million VIA Rail passengers
-  **Roads:** 52 million two-way passenger vehicle movements were recorded at Canada/ U.S border crossings

Domestic Trade

Of the produced goods that remained within Canada, over **875 million tonnes** were transported by the commercial sector in 2015. Nearly **72% of this amount was carried by for-hire trucking, 21% by rail and 7% by marine.**

International Trade

In 2016, the value of Canadian international waterborne trade amounted to **\$199 billion**, **\$125.2 billion** for Canada's international air cargo trade, **\$128.3 billion** for international rail trade traffic and the value of trucking traffic between Canada and the U.S totalled **\$418 billion.**



GOVERNANCE OF THE CANADIAN TRANSPORTATION SYSTEM

FEDERAL



Aviation and marine transportation, major railways, interprovincial and international bridges and tunnels, some transportation assets, and standards for new and imported motor vehicles

PROVINCIAL

Intraprovincial transportation undertakings/works including: intraprovincial rail, marine, ferry, truck and bus carriers; use of road vehicles; roads and bridges within a province, except national parks



MUNICIPAL



In many cases, the provinces have delegated responsibilities to local governments, including: local roads; public transit systems

STAKEHOLDERS & PARTNERS

Industry * Academia * Indigenous Peoples * International Partners



2 | CLIMATE RISKS TO THE CANADIAN TRANSPORTATION SYSTEM





THE CHALLENGE OF A CHANGING CLIMATE

- Canada's climate is changing - observed and projected climatic trends across Canada include:
 - ☀ **Increasing temperatures and temperature fluctuations**
 - ☁ **Changing precipitation patterns**
 - ⚡ **More severe and more frequent extreme weather events**
 - 💧 **Decreasing water levels**
 - ❄ **Permafrost thaw; increased freeze-thaw cycles (Northern Canada)**
 - 🏔 **Changes in sea ice – marine transportation (Northern Canada)**
 - 🌊 **Sea level rise and increased storm surges; increased coastal erosion (Coastal Canada)**

- Transportation is essential to virtually every economic sector in Canada (e.g. agriculture, natural resources, consumer goods, tourism)
 - Transportation systems in Canada have always been vulnerable to climatic variation and extremes
 - Climatic conditions are changing more rapidly and dramatically, and existing design values, standards and practices may not reflect new realities



Arctic shipping through sea ice



Derailment near Kingston, ON



Bridge failure, Stewart, BC



Permafrost degradation, Dempster Highway, NWT



Changes in water levels, Great Lakes



Sea surge, Sandspit Airport, BC

3 | PAN-CANADIAN FRAMEWORK ON CLEAN GROWTH AND CLIMATE CHANGE

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PAN-CANADIAN FRAMEWORK

The Pan-Canadian Framework on Clean Growth and Climate Change was developed with the provinces/territories and through engagement with Indigenous peoples – to meet our emissions reduction targets, grow the economy, and build resilience to a changing climate.

Four key pillars:

1 | Pricing Carbon Pollution

2 | Complementary actions to reduce emissions

3 | Clean technology, innovation and jobs

4 | Adaptation and climate resilience

- Translating scientific information and Traditional Knowledge into action
- Building climate resilience through infrastructure
- Protecting and improving human health and well-being
- Supporting particularly vulnerable regions
- Reducing climate-related hazards and disaster risks

4 | TRANSPORT CANADA'S ADAPTATION PRIORITIES

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TRANSPORT CANADA

Our Vision : A transportation system in Canada that is recognized worldwide as safe and secure, efficient and environmentally responsible.

Transportation 2030: A Strategic Plan for the Future of Transportation in Canada

- 1 | The Traveller
- 2 | Safer Transportation
- 3 | Green and Innovative Transportation
- 4 | Waterways, Coasts and the North
- 5 | Trade Corridors to Global Markets



TRANSPORT CANADA INITIATIVES

NTAI (Northern Transportation Adaptation Initiative)

Objective: Aims to enhance northerners' capacity to adapt their transportation systems to climate change.

Funding: Established in 2011; \$6.9M over three years (2018-2021)

Activities:

- Research to generate new knowledge
- Development and testing of innovative technologies and practices
- Collaborative activities to share knowledge and build capacity

TARA (Transportation Assets Risk Assessment initiative)

Objective: Better understand climate risks to federally-owned transportation infrastructure and potential adaptation solutions that could be employed

Funding: \$16.35M over five years (2017-2022)

Activities:

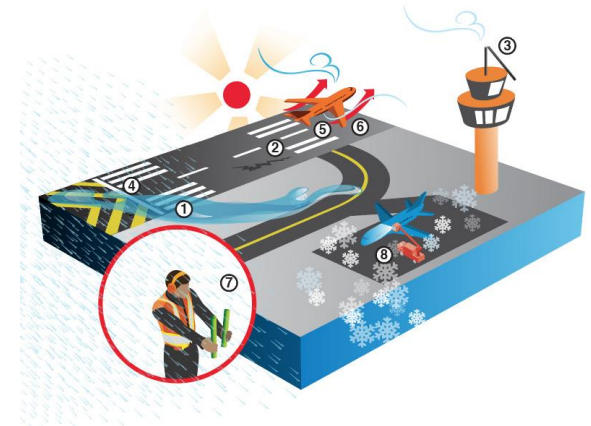
- Climate risk assessments
- Purchases and installations of tools and technology
- Associated training
- Research and analysis



CLIMATE RISK & ADAPTATION KNOWLEDGE ASSESSMENT

Climate Risks & Adaptation Practices for the Canadian Transportation Sector (2016)

- Comprehensive report of the current state of knowledge on climate risks and adaptation practices for the Canadian transportation sector
- Scope: All modes of transportation, all regions of Canada with specific examples and case studies
- Over 700 publications synthesized by 42 lead and contributing authors, and 228 expert reviewers were engaged in the process.
- Each chapter includes:
 - a profile of the region's population, economy, climate and transportation networks;
 - observed climate impacts, future risks, opportunities; and
 - adaptation approaches for road, rail, air, and marine transportation



NATIONAL TRADE CORRIDORS FUND

Program Features:

- Funding for infrastructure projects supporting fluidity of Canadian trade
- \$2 billion, 11-year, competitive, merit-based program
- Leverages investments from multiple partners
- One of the four objectives is to *“help the transportation system withstand the effects of climate change and make sure it is able to support new technologies and innovation”*

Climate Change Adaptation & Resilience Assessment (‘Climate Lens’):

- Applicants required to provide information on degree to which they take climate change impacts into consideration
- Proposals evaluated on how they will strengthen resiliency of Canada’s transportation system in a changing climate





5 | ADDITIONAL ADAPTATION ACTIVITIES AND INVESTMENTS

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FEDERAL FUNDING - EXAMPLES

Green Infrastructure Priority

Budget 2017 laid out the Government's plan to invest **\$21.9 billion in green infrastructure**. Of this, Infrastructure Canada will provide **\$9.2 billion** to provinces and territories over the next decade through bilateral agreements. An additional **\$5 billion** will be available for green infrastructure projects through the Canada Infrastructure Bank

Other Infrastructure Canada initiatives:

- **\$2-billion**, merit-based Disaster Mitigation and Adaptation Fund
- providing **\$40 million** to the National Research Council of Canada
- **Climate Lens**: applies to projects under the *Investing in Canada Infrastructure Program*, the *Disaster Mitigation and Adaptation Fund*, and finalists of the *Smart Cities Challenge*

Federation of Canadian Municipalities (FCM)

- The **\$75-million** Municipalities for Climate Innovation Program, delivered by FCM
- The **\$50-million** Municipal Asset Management Program, delivered by FCM

Natural Resources Canada

- Adaptation Platform



TRANSPORTATION ADAPTATION ACROSS CANADA

- Transportation adaptation stakeholders - at various stages of 'readiness'
 - shift from more reactive to proactive approaches


- Range of adaptation work across Canada. Some examples:
 - most provinces/territories have adaptation plans
 - operational planning, policies and design (e.g. BC Ministry of Transportation technical circular)
 - risk and vulnerability assessments (Greater Toronto Airport Authority engineering vulnerability assessment)
 - structural and physical engineering adaptation (e.g. testing of thermosyphons in the North to reduce permafrost thaw under infrastructure)
 - smart technologies (e.g. Port Saint John using real-time weather and wave forecasting tools)
 - operations and maintenance practices (e.g. cities more regularly monitoring and clearing drainage culverts)
 - adaptation research



THANK YOU

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