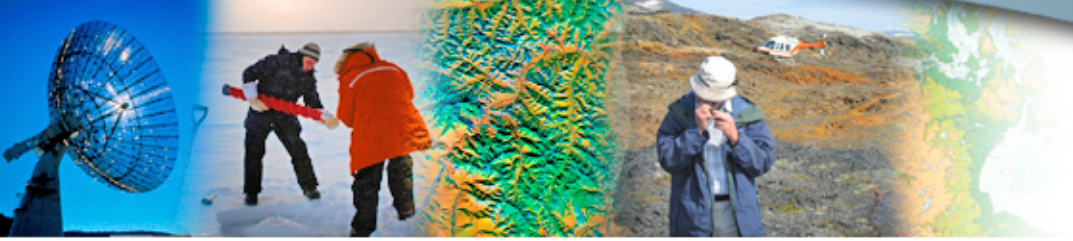


NATURAL RESOURCES CANADA - INVENTIVE BY NATURE

Climate Change Risks for the Canadian Energy Sector

IEA 6th Forum on the Climate-Energy Security Nexus

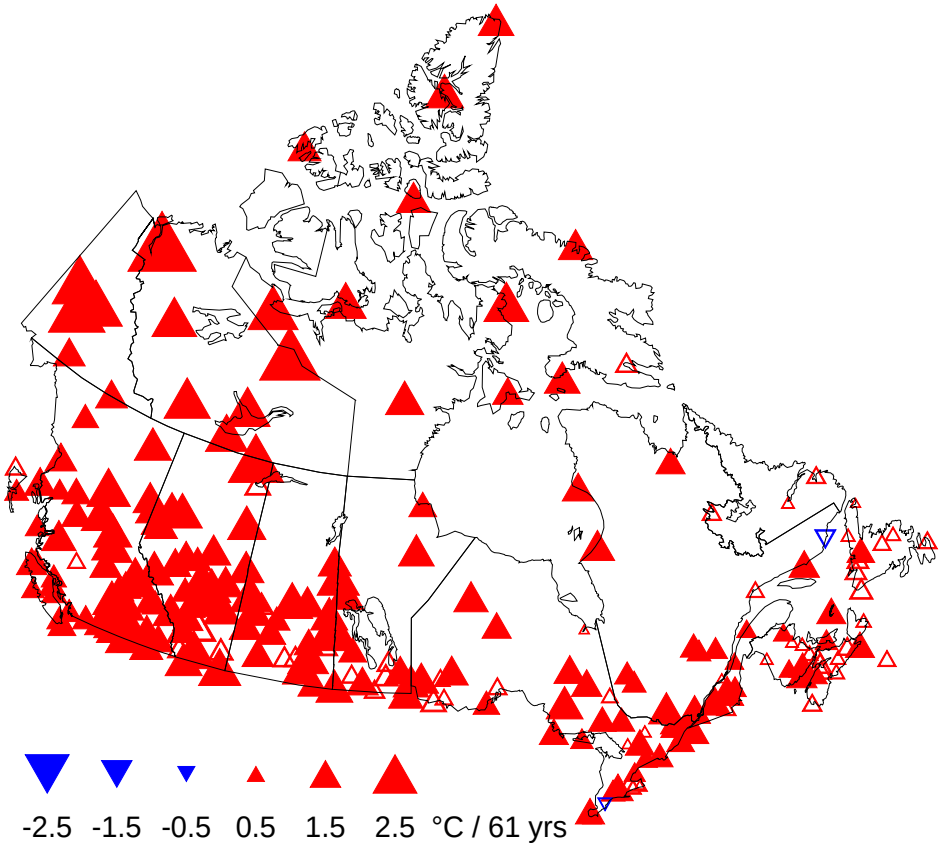
June 7th, 2016

Mary Preville, Director General

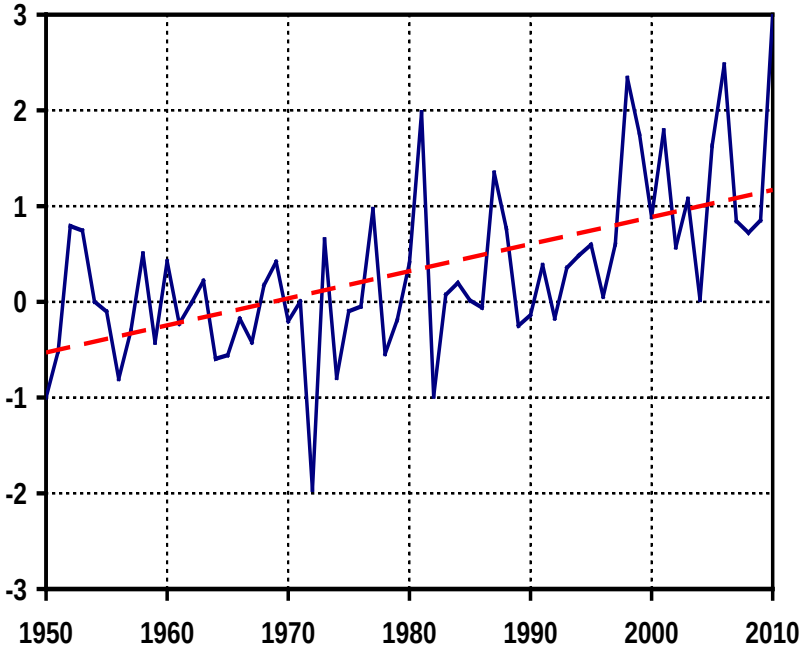
Earth Science Sector

Observed Temperature Changes

Amount of warming varies across Canada



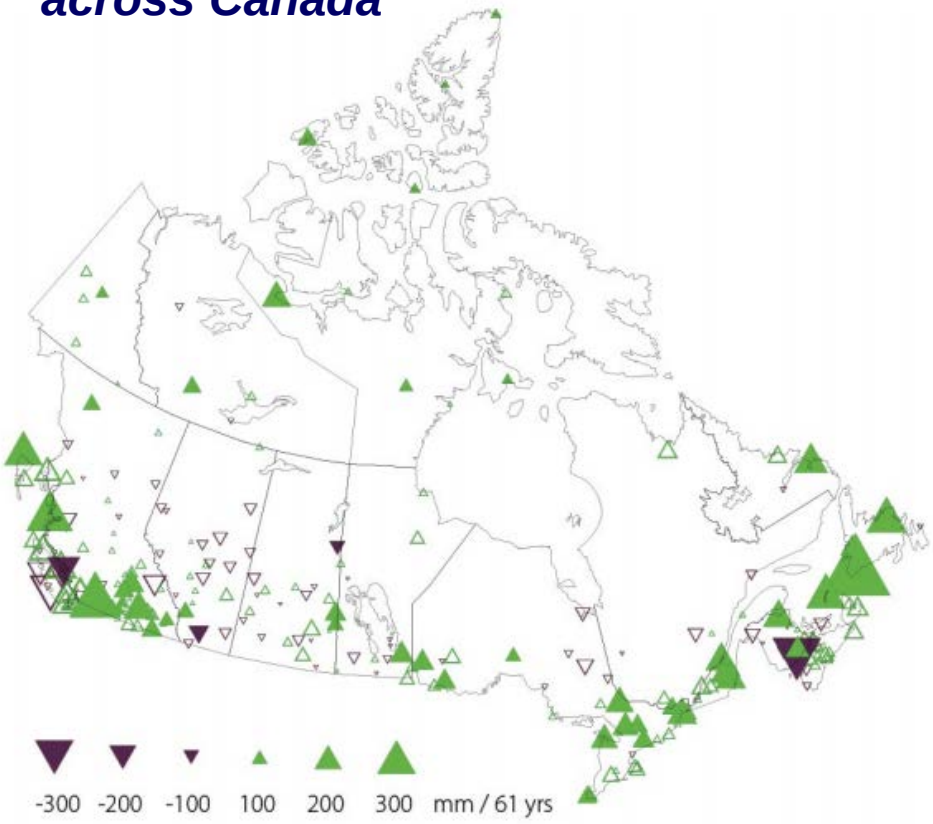
Warming trend of 1.5°C on average in Canada



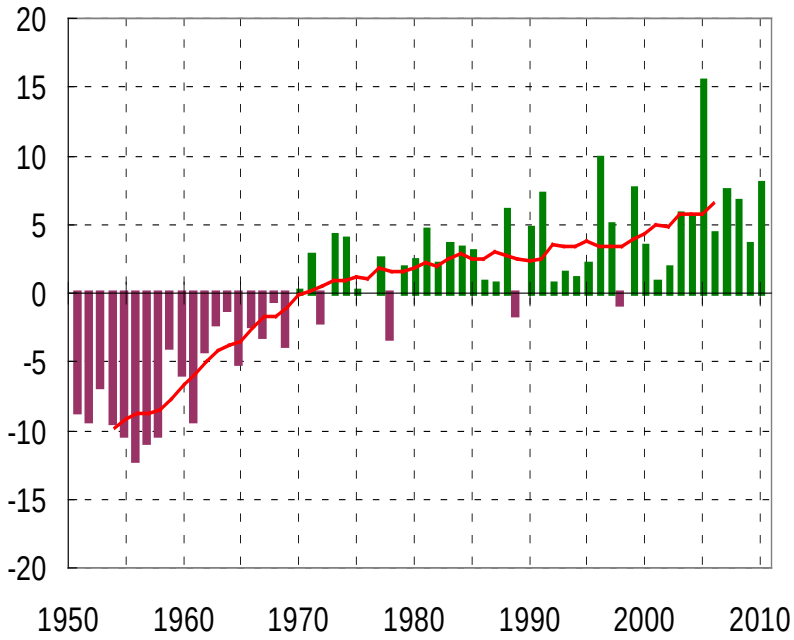
Annual mean temperature anomalies

Observed Precipitation Changes

Precipitation changes vary across Canada



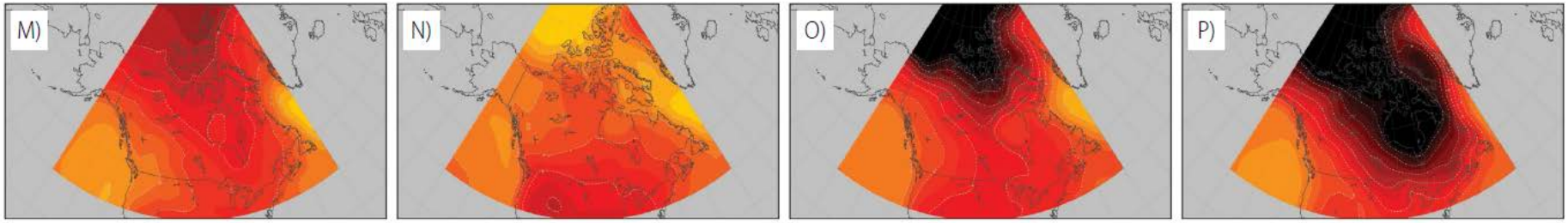
Increasing Precipitation



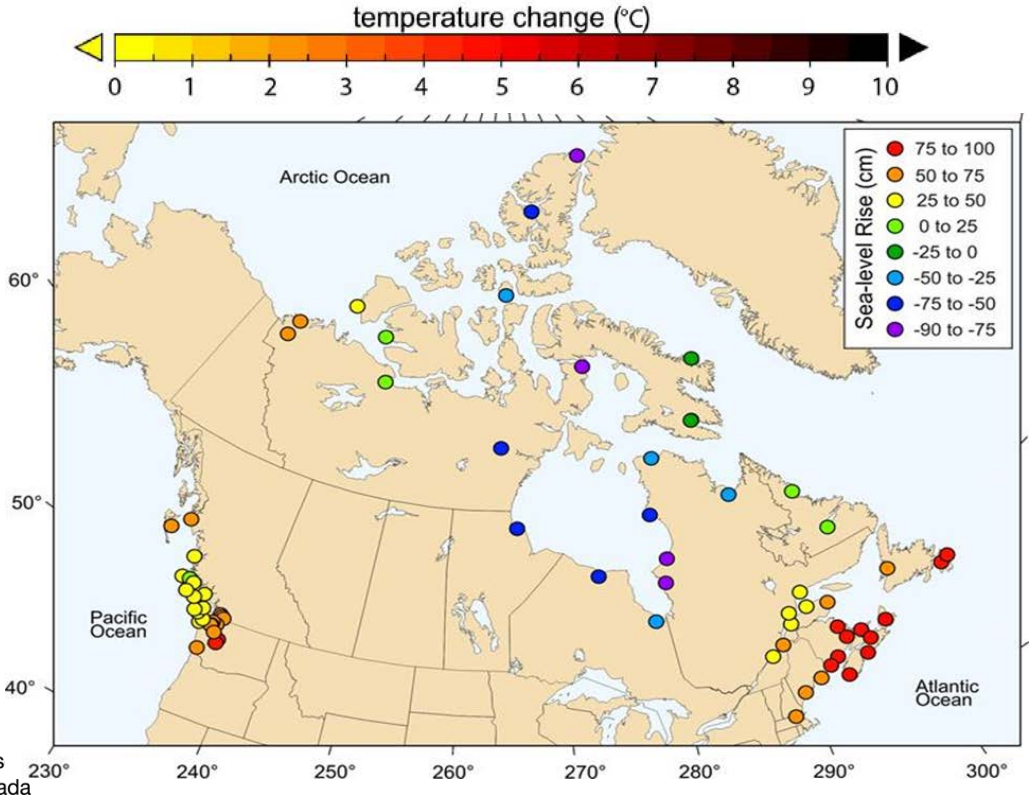
Annual total precipitation anomalies

Projected Changes

Temperature



Sea Level

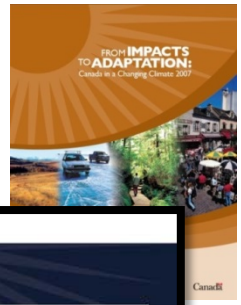


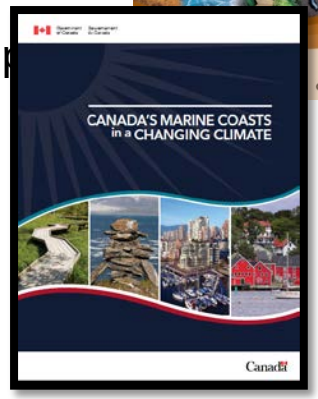
Canada in a Changing Climate

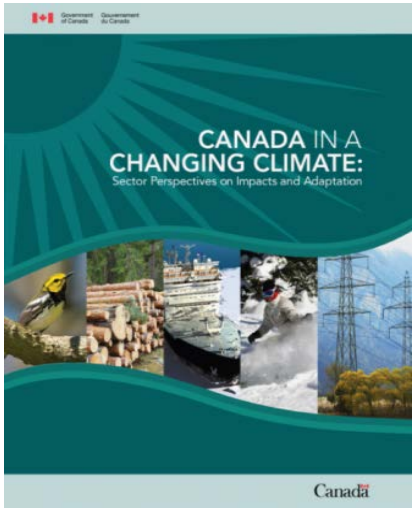
Science Assessments

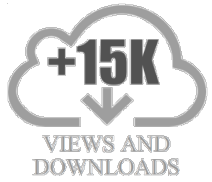
- 2014 - Canada in a Changing Climate - sectoral analysis of climate change impacts and adaptation.
- 2016 - Coastal Assessment and Transp Assessment (summer)

www.adaptation.nrcan.gc.ca









Scientific Research

- Climate change related research and monitoring e.g. permafrost, forest fires, glaciers, aquifers, sea level and coastal erosion
- Development and application of remote sensing technologies.

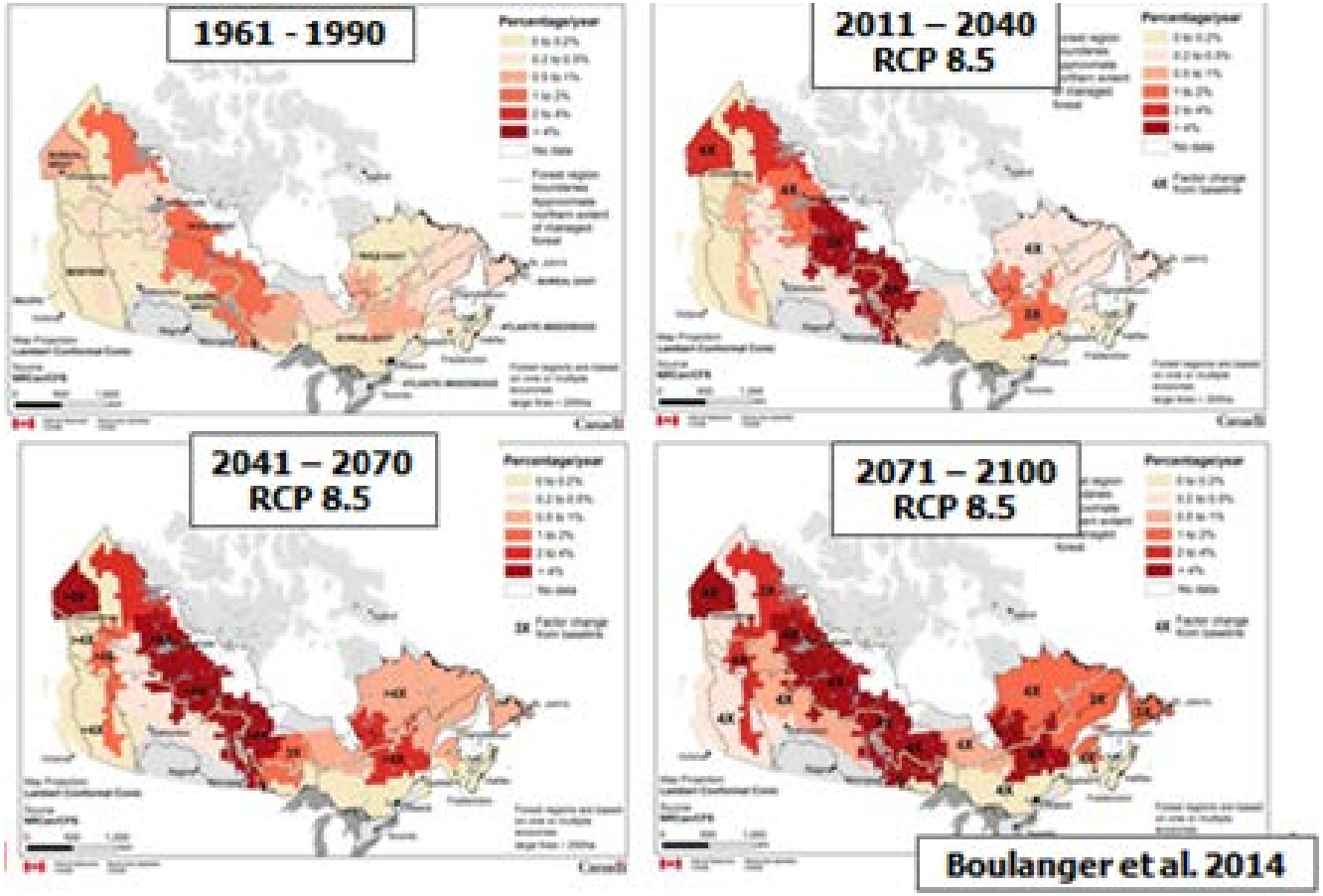
Canada in a Changing Climate

The Canadian Forestry Service's Research on Future Forest Fire Risk

Assess vulnerability of timber supply to increasing risks of wild fires across Canada

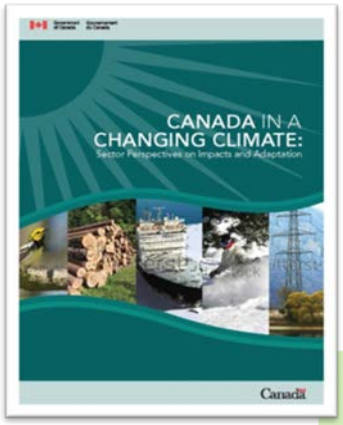
Mapping under different climate scenarios

- Future annual area burned
- Length of fire season
- Number of larger fires



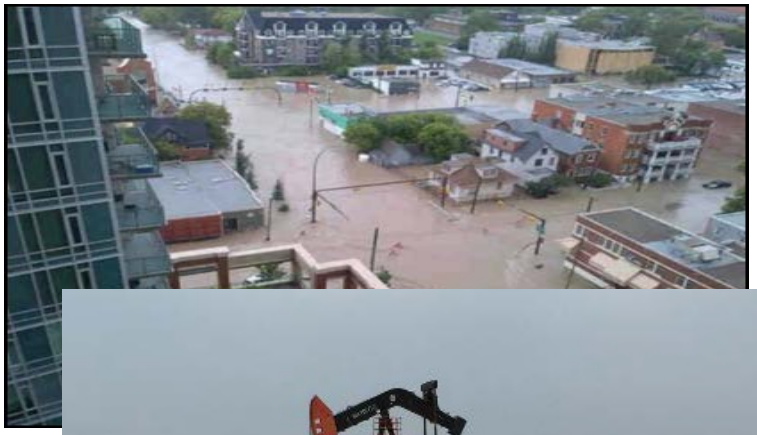
Future annual area burned

Climate Change Impacts on the Energy Sector



	Extreme Weather	Warmer Temperatures	Water Availability
DEMAND	• Increased peak electricity demand due to heat/cold waves	• Increased cooling demand; • Decreased heating demand	
SUPPLY	• Damage to production facilities; • Disruption in supply change	• Cooling issues in thermal plants; • Development in arctic	• Hydropower production; • Water for oil and gas production
TRANSMISSION	• Infrastructure damage due ice storms, landslides, etc.	• Reduced efficiency electricity transmission; • Infrastructure damaged by permafrost thaw	

Why adapt? Reducing risks. Seizing Opportunities



Canada's Adaptation Platform

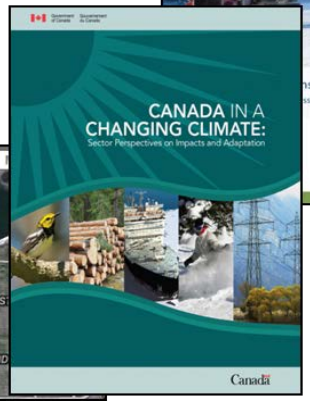
Climate Change Impacts

Climate Change Impacts and Adaptation Program

Adaptation Platform Plenary
Chair, CCIAD/NRCAN

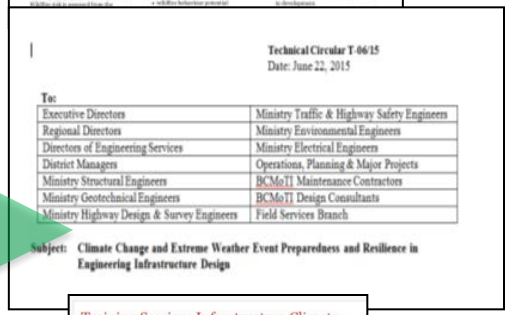
- Economics
- Coastal management
- Science assessment
- Northern
- Measuring progress
- Mining
- Forestry
- Energy
- Infrastructure
- Water and Climate Information
- Agriculture

Generating and sharing knowledge



Adaptation Outcomes

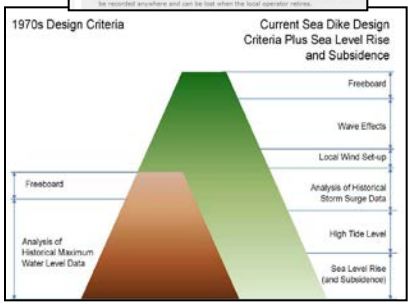

Four steps to *FireSmart* planning: communities managing wildfire in Alberta


Technical Circular T-06/15
Date: June 22, 2015

To:

Executive Directors	Ministry Traffic & Highway Safety Engineers
Regional Directors	Ministry Environmental Engineers
Directors of Engineering Services	Ministry Electrical Engineers
District Managers	Operations, Planning & Major Projects
Ministry Structural Engineers	BCMoTI Maintenance Contractors
Ministry Geotechnical Engineers	BCMoTI Design Consultants
Ministry Highway Design & Survey Engineers	Field Services Branch

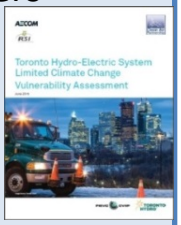
Subject: **Climate Change and Extreme Weather Event Preparedness and Resilience in Engineering Infrastructure Design**



Adaptation Platform's Energy Working Group Projects

Risk Assessments

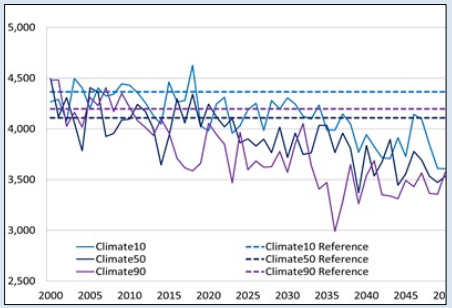
Toronto Hydro-Electric System Limited Climate Change Vulnerability Assessment
(Clean Air Partnership)
Assessment of climate change risks to electricity distribution infrastructure using Engineers Canada's PIEVC Protocol.
Also Ontario's Transmission System



Climate Risk Assessment for the Oil & Gas Sector in Northeastern British Columbia
(Fraser Basin Council)
Comprehensive inventory of climate change risks and successful engagement with the oil and gas sector.

Energy Demand

Integrating Changing Temperatures Trends into National and Regional Energy Demand Forecasts
Main objective: to inform supply management and planning. Current estimations of future energy demand are done without considerations for the changing climate.



- National study with the ENERGY 2020 model (March 2016)
- Regional studies: Yukon, Quebec, British Colombia, Manitoba

Adaptation Platform's Energy Working Group Projects

Tools

Advanced Decision Making Protocol - From Climate Change Scenarios to Decisions on Hydropower (Ouranos)

Helps translate risks into financial terms to assess adaptation options. Case studies with Manitoba-Hydro & Hydro-Quebec.

Best Practices

Adaptation Case Studies in the Energy Sector, Overcoming Barriers to Adaptation (Ouranos)

Fully documented cases studies from Canada and abroad , which are relevant to challenges faced by the Canadian energy sector.

Dissemination

The Adaptation Platform Webinar Series

Since 20102 - Over 40 adaptation webinars. Video recordings available online.
(webinars.cullbridge.com/AdaptationPlatform)

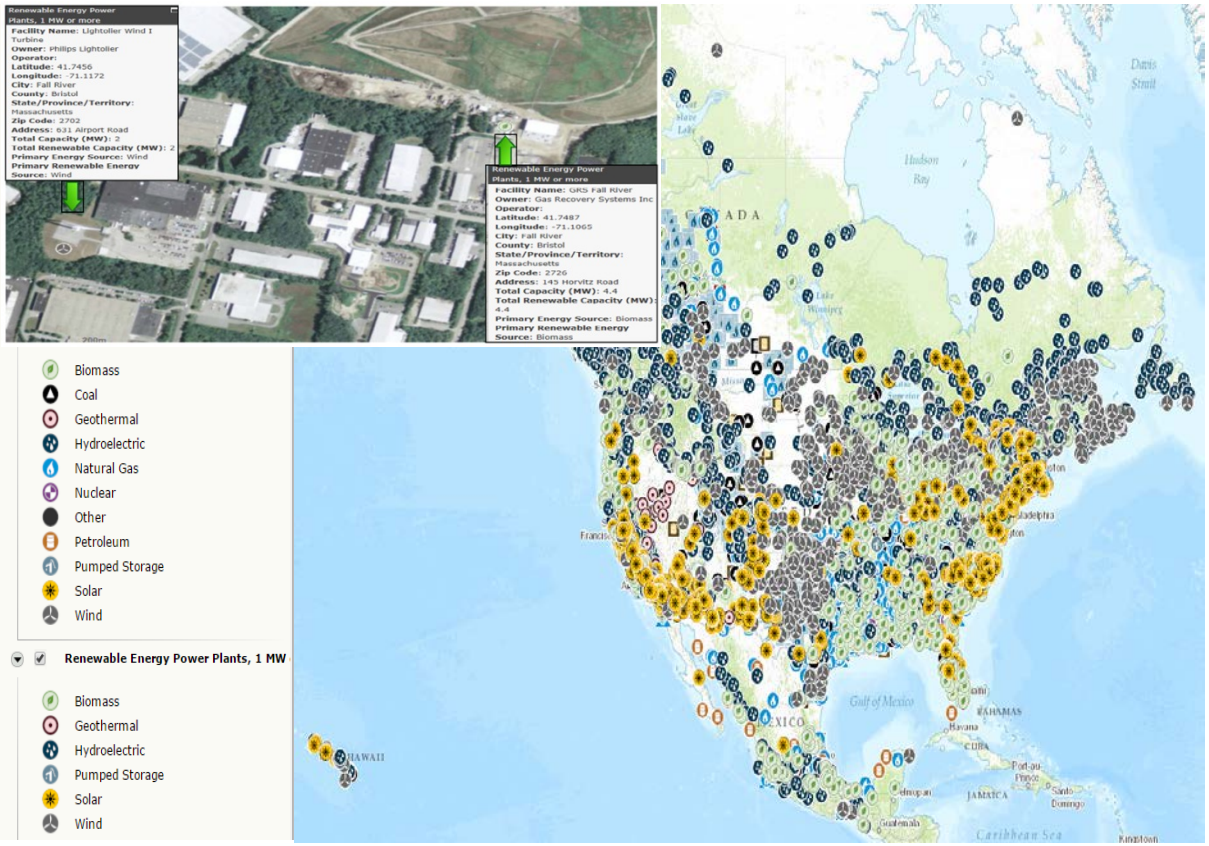
Federal Initiatives to Address Climate Change Risks

North American Cooperation on Energy Information (NACEI)
CCMEO's Mapping of Energy Infrastructure

Developed maps for:

- Natural Gas Processing Plants
- Liquefied Natural Gas Import and Export Terminals
- Refineries and Upgraders
- Electric Power Plants
- Renewable Electric Power Plants

Interactive maps are available via new trilateral information website (www.NACEI.org).



Domestic Policy Context

- Pan-Canadian Framework on Clean Growth and Climate Change
- Weather-related emergencies and natural disaster action plan
- Green infrastructure, incl. climate resilient infrastructure
- Investing in clean technology and supporting innovation
- Environmental assessment process review
- Modernizing the National Energy Board
- Sector/department-specific mandates and priorities