

# Climate Change Impacts & Adaptation in Ontario: Natural Resources

Ontario Centre for Climate Impacts and Adaptation Resources (OCCIAR)

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## Overview

Natural resource industries such as forestry, mining and energy are vital to the Canadian economy, accounting for 13 percent of Canada's GDP in 2012 and providing 950,000 jobs (NRCan, 2013). All natural resource sectors face risks from climate change, many of which are related to extreme weather events and associated natural hazards. Future climate change impacts are expected to exacerbate existing risks to the planning and management of natural resource sectors. While adaptation actions are most evident where there is a clear link between climate and resource availability (i.e. forest and hydroelectricity), there are examples of adaptive management approaches being applied to manage the impacts of climate change in all natural resource sectors. Despite a good understanding of the basic biophysical impacts of climate change on natural resources, and processes such as environmental assessments, vulnerability assessments, risk disclosure and sustainable forest management reporting that can help facilitate the implementation adaptation measures, the integration of adaptation into business planning has generally been lacking (Lemmen et al., 2014).



## Forestry

Climate impacts such as increasing forest fires, more frequent and widespread outbreaks of pests and diseases, drought, and changing forest composition have been observed in Canadian forests. In Ontario, these risks are projected to increase significantly in the future. Climate models predict an increase in the severity of forest fires in Northwestern Ontario, and an overall increase in the length of Ontario's fire season (Colombo, 2008). The mountain pine beetle could spread into Ontario by the middle of the century. A general northward migration of tree species will continue in response to temperature and other climate changes (Colombo, 2008). The rate of projected climate changes exceeds the rate at which most species can adapt through natural physiological and genetic processes, and therefore new management approaches may need to be considered. In Ontario, the City of Greater Sudbury has recognized potential future risk from climate change within the context of urban forests and revegetation. The City has employed assisted migration and forest transplants in their re-greening efforts and the City of Toronto Urban Forestry Services has employed new planting techniques that protect urban forests from climate impacts (CAP, 2012).

## Mining

Climate change impacts such as permafrost thaw, hydrological changes, and extreme weather events can affect every aspect of the mining process from exploration to post-closure care and maintenance. Tailings facilities or other infrastructure are at higher risk as a result of extreme weather, potentially releasing contaminants into surrounding environments. The risk of these types of incidents may increase in the future, with post-closure sites particularly vulnerable due to their aging infrastructure. Climate change also presents opportunities for the sector, particularly with respect to increased marine transport through the Arctic. There are examples of structural and non-structural adaptation measures employed by some mining companies. In Ontario, the Victor Diamond mine has instituted structural changes such as widening winter roads, the construction of all-season roads and airstrips, the use of rig mats for large water crossings, and optimizing logistical arrangements to accommodate winter road availability (Rodgers et al., 2014). However, there is concern that adaptation is not more widespread across the sector.

## Energy

Climate change will affect both demand and supply of energy in Canada. Seasonal demand for energy will shift with an increased demand for summer cooling and decreased demand for winter heating, hydropower generation may be affected by changes in water supply, and permafrost thaw poses a risk to energy infrastructure in the northern areas of the province (Figure 1) (Schaeffer et al., 2012; Boyer et al., 2010; Furgal and Prowse, 2008). In Ontario, studies have demonstrated that electricity demand in Ontario is sensitive to climate variability, as well as the trend toward more frequent, extreme heat days (Lin et al., 2011).

CLIMATE VARIABILITY AND CHANGE

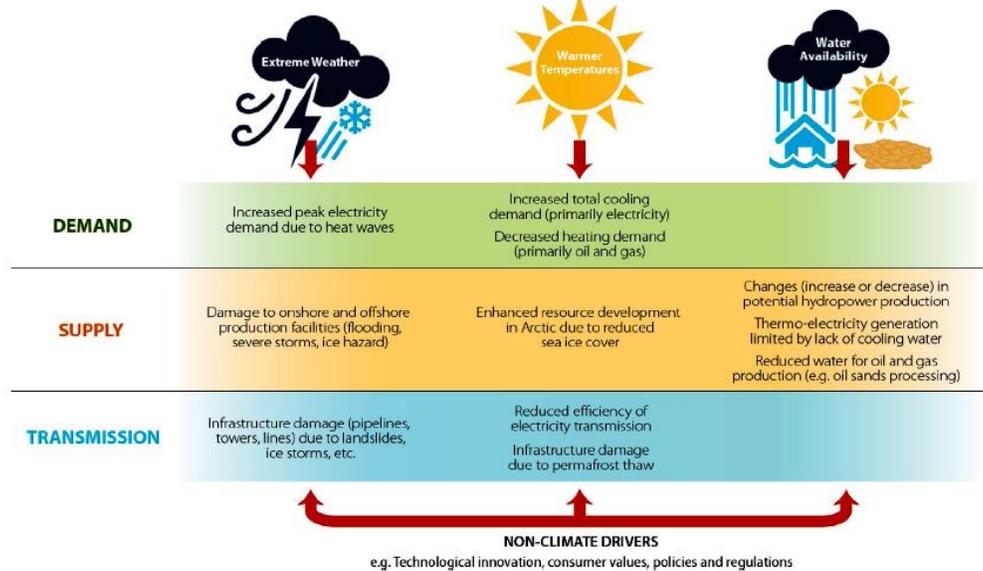


Figure 1: Climate change impacts in the electricity sector, recognizing the importance of non-climate drivers in determining adaptation actions (Lemmen et al., 2014).

Aging and inadequate infrastructure exacerbate climate vulnerability in many Ontario communities. Recognizing the importance of resilient infrastructure, the Environmental Commissioner of Ontario asked for an in-depth assessment to determine whether the electricity grid in Ontario will remain reliable under a changing climate (ECO, 2012).

Several adaptation measures for the energy sector are underway in Ontario communities. Actions that improve resiliency such as the installation of smart grids and policies to reduce extreme heat such as Toronto’s Green Development Standard signal a move toward reducing climate change risks (IESO, 2013; City of Toronto, 2015).

Adaptive management techniques have been adopted by many energy companies/operators to manage climate-related impacts. Toronto Hydro has undertaken a vulnerability assessment to better identify, understand and manage climate-related risks, while information campaigns and outreach programs are available in many Ontario municipalities to help users manage their energy use more efficiently and prepare themselves for power outages. The international Carbon Disclosure Project allows energy companies around the globe to report on material risks resulting from climate change and the action they are taking to address those risks.

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The information presented is based on Chapter 3 of NRCAN’s 2014 National Climate Assessment titled **Canada in a Changing Climate: Sector Perspectives on Impacts and Adaptation** with additional Ontario-specific information. For more information on the National Assessment, please visit: [www.nrcan.gc.ca/environment/resources/publications/10766](http://www.nrcan.gc.ca/environment/resources/publications/10766)



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