The Municipal Adaptation and Resiliency Service (MARS)

Webinar 5

Building Code & Land Use Planning in a Changing Climate
1 MARS WEBINAR SERIES
9 webinars

- Webinar 1: Introduction to Municipal Climate Adaptation and Climate Projections for Great Lakes Region
- Webinar 2: Portal tour
- Webinar 3: Financial and Legal Implications of Climate Change for Municipalities
- Webinar 4: Transportation Infrastructure

Webinar recordings stored on MARS Community of Practice (CoP) Portal: https://www.ccadaptation.ca/en/mars
SECTOR SPECIFIC WEBINARS (5-8) OVERVIEW

- Webinar 5 – Building Infrastructure and land use planning, **Today**
  Guest Speakers: Brian Kyle, Chair, PIEVC, XTN ltd
  Barb Hodgins, Town of Ajax

- Webinar 6 – Vulnerable Populations, **March 6th**
  Guest Speaker: Karina Richters, City of Windsor

- Webinar 7 – Urban Natural Systems, **March 20th**
  Guest Speaker: TBD

- Webinar 8 – Water / waste water / storm water, **March 27th**
  Guest Speaker: John Nemeth, Region of Peel

- Webinar 9- (Not sector specific), Communication and Collaboration, **April 10th**
  Guest Speaker: Dr. David Pearson, Laurentian University
1. MARS Training Series Overview

2. Introduction, Kevin Behan, Clean Air Partnership

2. A) Impacts of climate change and extreme weather on municipal building infrastructure
   B) Presentation by: Brian Kyle, Chair of the PIEVC Buildings Expert Working Group

3. A) City land-use planning in a changing climate
   B) Presentation by: Barb Hodgins, Senior Policy Planner, Town of Ajax

4. Resources

5. Portal discussion
2 Municipal Building Infrastructure and Land Use Planning in a Changing Climate
Exposure to weather extremes not accounted for in original design; construction occurred on assumption that past climate extremes will represent future conditions.

- Shorter life span and reduced performance
- Increase in maintenance and operating costs
- Disruption to municipal operations and public safety compromised
- Severe and unanticipated economic losses because of damaged or overwhelmed infrastructure

Climate related risks further aggravated by:
- Aged infrastructure that has exceeded normal service life
- Frequent co-location and interdependency
- Decline in public spending
- Ballooning populations
Increase in the severity and frequency of:

- Uncontrolled moisture accumulation in structural materials, reducing building structural integrity through mechanical, chemical and biological degradation
- Deterioration of exterior building facades
- Premature weathering of input materials (i.e.: wood decay and metal corrosion)
- Adverse impacts on effectiveness of thermal insulation
- Efflorescence, fractures and spalling of foundations and masonry systems
Increase in the severity and frequency of:

- Facility power outages, loss of electric heat sources
- Challenges to design safety margins; building structure collapse due to increased snow pack, wet snow
- Accelerated freeze thaw cycles causing:
  - Premature aging of porous materials, (i.e.: stone, brick masonry and mortar)
  - Water damage from ice-damming on roofs
  - Break-up of bonded materials and facades
  - Challenges to concrete integrity
Precipitation/flooding/snow/ice
Land Use Planning Considerations

• In land use planning, adaptation options area limited by the geographical location and scale of development

• Include policy statements in the development plan that commit to minimizing the effects of flooding

• Locate new developments away from high risk areas

• Ensure planning accounts for future flooding trends, designate such areas recreational or agricultural

• Use secondary plans as tools to ensure proper drainage

• Use zoning bylaws to ensure adequate greenspace
Planning Act and Conservation Authorities Act
Hotter, drier summers and heat waves—Building effects

- Damage to building foundations due to ground shrinkage, drying out of clay
- Integrity of building structure compromised by lack of moisture in concrete
- Premature weathering of building materials
- HVAC systems unable to support facility demands, causing; thermal discomfort, increases in maintenance costs and energy consumption (GHG emissions)
- Increase in electrical transformer failure
  - Increase in Solar UV radiation- alters dimensions of materials, cracks and fissures polymer-based materials, i.e.: vinyl cladding, window frames, sealants and gaskets
  - Heat related risks exacerbated among vulnerable urban populations and residents high rise residential buildings
• Use soil surveys to inform development plans when deciding on land use designations

• Ensure agricultural designations in development plans account for changing soil conditions

• For rural developments, wells may not be possible for water provision, consider development plan policies that direct developments to existing centres with preexisting infrastructure

• Consider development plan policies to address risk of fire

• Use LANDSAT thermal imagery to map hot spots in your jurisdiction

• Use Official Plan policies to reduce urban heat islands

• Orientation of new developments
Wind & Tornadoes – Building effects

Increase in the severity and frequency of:

- Loss or failure of roof panels
- Facility power outages affecting electric heating and cooling sources
- Challenges to building envelope (exterior walls, foundations, roof, windows and doors)
- Deteriorated or damaged built infrastructure located in areas susceptible to high winds

- Land use consideration – use tornado mapping provided by Environment Canada when developing land use plans

Fig. 2. Incremental building loss claims as a function of peak gust speed for Australia (Insurance Australia Group (IAG)).
Source: Coleman (2002)
4  Vulnerability of Building Infrastructure to Climate Change in the Ontario Great Lakes Region

Brian Kyle

- Chair of the Public Infrastructure Engineering Vulnerability Committee (PIEVC), Buildings Expert Working Group
- Director of Operations at XTN Sustainable Life-cycle Asset Management Consulting Ltd.
5 Integrating climate adaptation considerations into land-use planning in the Town of Ajax

Barb Hodgins

- Senior Policy Planner, Town of Ajax
Resources: Building Infrastructure

- Green Building and Climate Resilience: Understanding impacts and preparing for changing conditions

- Weathering of Building Infrastructure and the Changing Climate: Adaptation Options

- Climate Change Vulnerability Assessment for Infrastructure Ontario: Case Study Report

- Cities and Communities: The Changing Climate and Increasing Vulnerability of Infrastructure

- UNEP Buildings and Climate Change: Summary for Decision-Makers
  http://www.unep.org/sbci/pdfs/sbci-bccsummary.pdf
Resources: Land Use Planning

- Climate Change Adaptation Planning: A Handbook for Small Canadian Communities
- Manitoba Planning Resource Guide: Climate Adaptation through Land Use Planning
- A Guide for Incorporating Adaptation to Climate Change into Land Use Planning
- Integrating Climate Change Adaptation into the Town of Ajax Official Plan
- CIP Policy on Climate Change
- CIP Planning for Climate Change Resource Library
  [http://planningforclimatechange.ca/wwwroot/dsp_Library.cfm](http://planningforclimatechange.ca/wwwroot/dsp_Library.cfm)
Webinar 6

Vulnerable Populations
March 6\textsuperscript{th} 2014

Presentation by:
\textit{Karina Richters, City of Windsor}

For more information, please visit:
\url{https://www.ccadaptation.ca/en/mars}